PRICE 50 CENTS

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

AUGUST 27, 1956

Shrinkage Factors for Molded Nylon

To Whom Is Management Responsible?

Heald VERSATILITY in action

How a STANDARD* Plain Internal Grinder SAVED IDLE MACHINE TIME

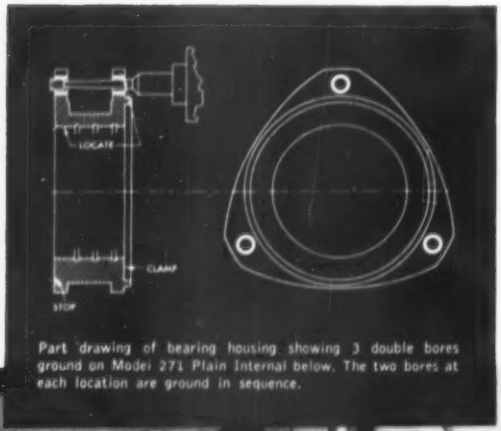
Heald Model 271 does a month's production ALL IN A DAY'S WORK . . . and can do many other jobs in its "spare time"

THE race is not always to the swift. For example: An aircraft manufacturer requested a quotation on a Model 271 Size-Matic for grinding three double bores in a bearing housing. Production requirements — 25 parts per month. A high-speed Size-Matic would do the whole job in less than a day — and be idle the rest of the time. So Heald engineers recommended a Model 271 Plain Internal instead. This *semi-automatic* machine could still do the whole month's production in one day — yet because of its inherent *versatility*, the standard Plain machine could be used for many other internal grinding jobs in its "spare time".

This solution to the problem not only saved on the initial investment, but avoided idle machine time and contributed to greater productivity and lower costs. The 271 Plain Internal, and the job for which it was ordered, are shown below. For the *best answer* to any precision finishing problem . . .

It PAYS to come to Heald

*Send for Bulletin 2-2569-I, Issue 1.



Part drawing of bearing housing showing 3 double bores ground on Model 271 Plain Internal below. The two bores at each location are ground in sequence.

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

NEWS REPORT...

... Spot News .. 73
... Washington .. 75
... Detroit .. 77
... Machine Tools .. 79
... What's Ahead .. 83
... General News .. 130
... Field Report .. 137
... Names .. 138

Departments...

Letters .. 66
Editorial .. 87
Round Table .. 113
Practical Ideas .. 116
Talking Shop .. 129
New Equipment .. 140
Discussion .. 164

contents for August 27, 1956

VOLUME 100, NUMBER 18

Now gages can be made of plastic ... Epoxy resins have the stability needed for gaging surfaces, adding a new use to their tool and gage applications. *By Robert E Griffith, Lockheed Aviation Corp.* **89**

We learned about nylon by trying ... After many trials, Friden Calculating Machine Co has developed special dies, standards on shrinkage, a normalizing procedure to relieve stresses, and a handy color code with household dye **93**

Chevrolet welds wheels now ... Change from riveting to spotwelding required a new setup. Piercing and punching are incorporated in the automatic welder. New handling methods are shown. *By George H De Groat* **96**

Care keeps live centers longer ... Rules from The Ready Tool Co for preserving the life and accuracy of ball-bearing centers. **101**

What are the responsibilities of management? ... First of all, to the people managed. *By J Irwin Miller, Cummins Engine Co.* **102**

"Skyhook" supports radial drill ... Drillhead and arm are mounted on a special carriage built into the bridge of an overhead crane. Working area is the entire shop. *By Richard F Thuma, Allis-Chalmers Mfg Co.* **114**

SPECIAL REPORT NUMBER 429

New tooling and techniques work wire ... Key steps in making wire-spring relays for telephone switching systems. Includes wire straightening, progressive dies, welding on contacts, and assembly in plastic bodies. *By James W Rice, Western Electric Co.* **105**

PRACTICAL IDEAS **116**

Another Dovetail Slide Setup
Gage Checks Male Threads
Drillpress Assembly Fixture
Round Carbide Tools
Head On Drift Utility Tool
Chucking Mandrell Holds Tubing
Recessed Angles Checked
Reamers Sharpening Fixture
Altered Threads Speed Clamping
Clock Records Working Time
Trig Finds Chamfer Height
Scale Holder for Layout
Adjustable Centralizing Fixture
Drilling Safer With Helper
Sharp Corners On Gages
Field Coil Demagnetizer

REFERENCE BOOK SHEETS

Tap-drill selection, I, II, III ... Tables showing the tap drills required to obtain desired percentage of thread engagement. *By Warren G Ogden, Jr, Massachusetts Institute of Technology* **123**

American Machinist *Chips*

Cover . . .
Crane-mounted radial drill saves at least 50% on big jobs at Allis-Chalmers. Article on page 114 describes construction and operation of this unique machine tool.

Right number . . . You may recall that last spring we ran an unusual report, "Tooling Behind the Telephone" (*AM*—Apr 9 '56, p137). Unusual in several respects. For one thing, it was 24 pages on the manufacture of a product no one else made—the Bell telephone. For another, it came from a company that has not been noted for sharing its know-how, but the dependability of whose product is known to almost everyone.

One of our major problems lies in trying to anticipate what you will like. To do this we have many guides, including a sampling of how you liked every past article. But you can't steer a ship just by watching the wake. And on the telephone story we had some serious doubts about how you would take to so much about a specialized item. Your response proved that we should never had doubted that the average reader would see it for what it was: a collection of wide-ranging production ideas that could be adapted to lots of things besides telephones.

With this encouragement, we've gone to another Western Electric plant, this one at Hawthorne, Ill, for the Special Report in this issue. It is all on wire work, and we are confident that you will see in it much more than the production of wire-spring relays for telephone switching systems. What it is, is a valuable collection of new tooling and techniques to work wire. Where it starts, is page 105.

Speaking of your reaction, brings to mind that an editor's job can sometimes be lonely and frustrating. We spend most of our time talking to you, the reader, but we too seldom hear you answer back. Sometimes you have written hundreds of letters to the author of an article, and we hear about it from him only by chance. We study you with reader surveys, and the chances are good that you personally have had a chance to talk back on one of them, but this is rather impersonal and statistical. We go to see as many of you as we can in the course of our travels through the metalworking industries, but there are about 40,000 of you and life is short. So when you have a gripe, a suggestion, or even something nice to say, just pick your favorite editor off the list at right and drop him a note. You'd be surprised how happy he'll be to hear from you.

Coming . . . *AM* for Sept 10 will feature a Special Report on automatic assembly, the biggest development in automation this year. There'll be articles on how Ford reworks obsolete tools, estimating for turret drills, contour boring, some tooling ideas from Arma, and a story that will describe the machining of nylon parts.

J Irwin Miller . . . is chairman of the board of Cummins Engine Co, Columbus, Ind. Mr Miller was graduated from Yale in 1931 and went to Oxford as a Rhodes Scholar. He was president of Cummins from 1945 to 1951. His article, "What are the responsibilities of management?" is based on a lecture presented early this year as part of the Great Issues course at Dartmouth College.

ALBERT HAUPTLI publisher

BURNHAM FINNEY editor
E J TANGERMAN executive editor

ANDERSON ASHBURN managing editor
RUPERT LE GRAND senior associate editor

BEN BROSHEER (Chicago) associate editor
H E LINSLEY associate editor
CHARLES D EMERSON associate editor
WM M STOCKER, JR associate editor
JOHN P WRIGHT associate editor
GEORGE H DE GROAT (Detroit) associate editor

ANN McTAGUE assistant editor
TOM JOHNSON assistant editor
GOSTA WERNBERG assistant editor

RICHARD E BOOMAN art director
ANNE PALMER assistant
MATTHEW T HAGGERTY makeup

ROBERT SHEETS news editor
HARRY HOMEWOOD Detroit
ROBERT E COCHRAN Cleveland
MARGARET RALSTON San Francisco
JOHN SHINN Los Angeles
HAROLD HOOD Los Angeles
A R HENRY Atlanta
WILLIAM J COUGHLIN London
ROBERT E FARRELL Paris
PETER WEAVER Rio de Janeiro
GERALD W SCHRODER Bonn
DAN KURZMAN Tokyo
JOHN H KEARNEY Mexico City
DOUGLAS GREENWALD statistician
M K MATULIS assistant statistician

DEXTER KEEZER director economics dept
GEORGE B BRYANT, JR chief Washington bureau
JOHN WILHELM editor world news
FRED H COLVIN editor emeritus

GEORGE REPPERT, JR advertising sales manager
RUSSELL T DOUGLAS business manager
CATHERINE C KANE manager, reader service

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

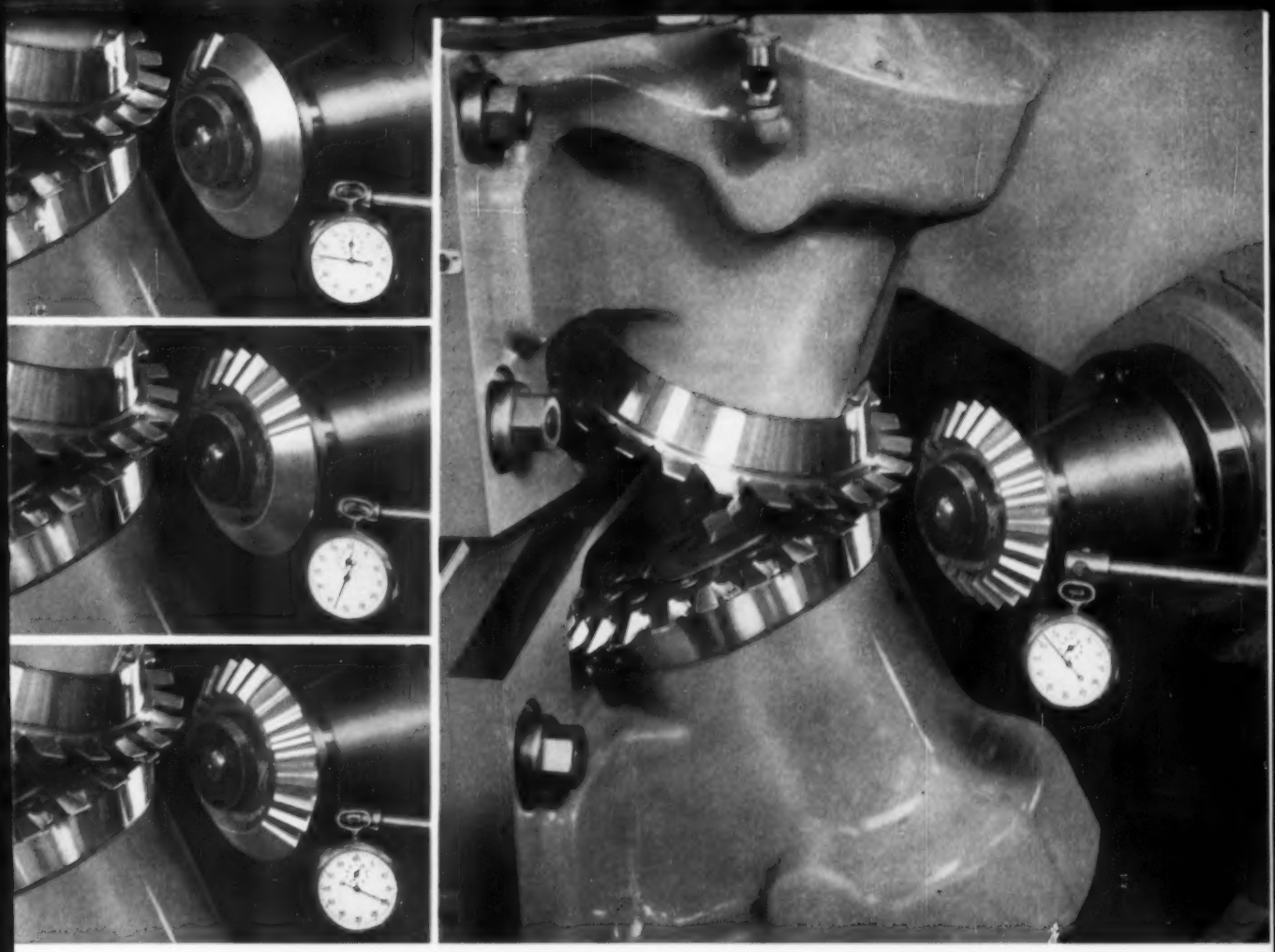
American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc, James H McGraw (1860-1948), Founder.

EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, NY. Donald C. McGraw President; Paul Montgomery, Executive Vice President; Joseph A Gerardi, Vice President and Treasurer; John J Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Joseph H Allen, Vice President, Director of Advertising Sales; J E Blackburn, Jr, Vice President and Circulation Director.

SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, NY. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.

Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Second-class mail privileges authorized at New York, NY.

Copyright 1956 by McGraw-Hill Publishing Co, Inc—All Rights Reserved.



3 minutes-52 seconds, completed from the solid

You can cut gears 5 times faster!

You can increase production by as much as 400%.

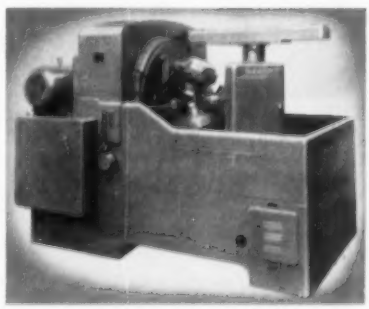
Your exact gain may vary with different gears, but in most cases this new generator will complete five gears in the time earlier models cut just one. The illustrations above show a 6 DP, 25 tooth, 7/8" face width, straight bevel gear completed from the solid blank.

The No. 104 Straight Bevel Coniflex* Generator completes each tooth in one rapid operation. A pair of multi-blade disc-type cutters combined with a cam-controlled machine cycle insures high efficiency, fine finish and maximum cutter life.

Easy to set up, the No. 104 has a wide range of capacity. You'll get the same excellent results for both small quantity jobbing work and volume production.

To discover other savings you can make with this remarkable Gleason Generator, simply write for descriptive bulletin.

*Coniflex® straight bevel gears with localized tooth bearings.



The Gleason No. 104 Straight Bevel Coniflex Generator cuts gears up to 8½" diameter, 4½" cone distance and 1⅝" face width, from 20 to 3 DP, ratios up to 10 to 1.

GLEASON WORKS

Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

Why Costs Go Down

with Cincinnati ML and MI

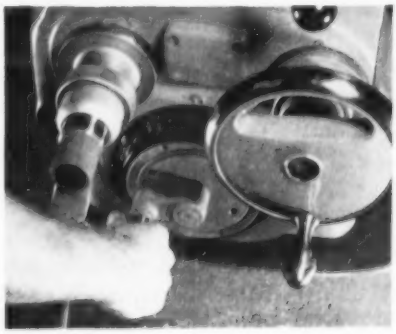
Did you ever look at a metalworking machine—or an automobile—or a kitchen ensemble—and wonder why certain features were included? You don't have to wonder why when you look at a CINCINNATI® ML or MI Milling Machine. Everything is modern as tomorrow, yet practical as the basic reason for new machine tool purchases . . . *to reduce your costs.* Just take a look at the features illustrated here and tabulated below. Advantages are quickly apparent.

- 16 feeds, ¼" to 30" per min. Higher range optional
- 16 spindle speeds, 25 to 1500 rpm. Lower and higher ranges optional
- Single crank selection of spindle speeds with hydraulic gear shift
- Single crank selection of feeds
- Independent, directional controls
- Live rapid traverse
- Available in the styles desired by your shop
- Attachments to suit your needs

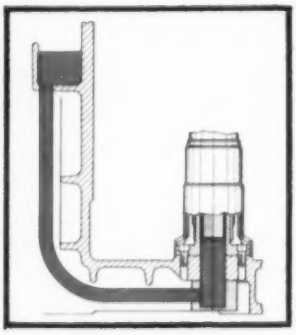
CINCINNATI ML and MI Milling Machines are unquestionably your best buy for medium duty variety milling or both variety and production milling. Want more information? Look in Sweet's Machine Tool Catalog, or write for a copy of catalog No. M-1916-1.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

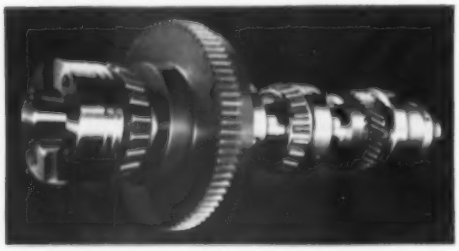
Automatic Table Cycle machines (Plain and Vertical styles) combine high production and toolroom features



Feed rates are quickly and easily selected with a single crank-type control at the front of the knee

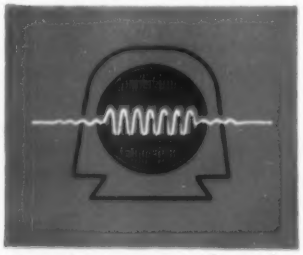


Vertical screw is submerged in a bath of oil from its own reservoir, assuring long, accurate life



Anti-friction mounting with center support for the heavy spindle assembly, smoothly transmits maximum cutting power

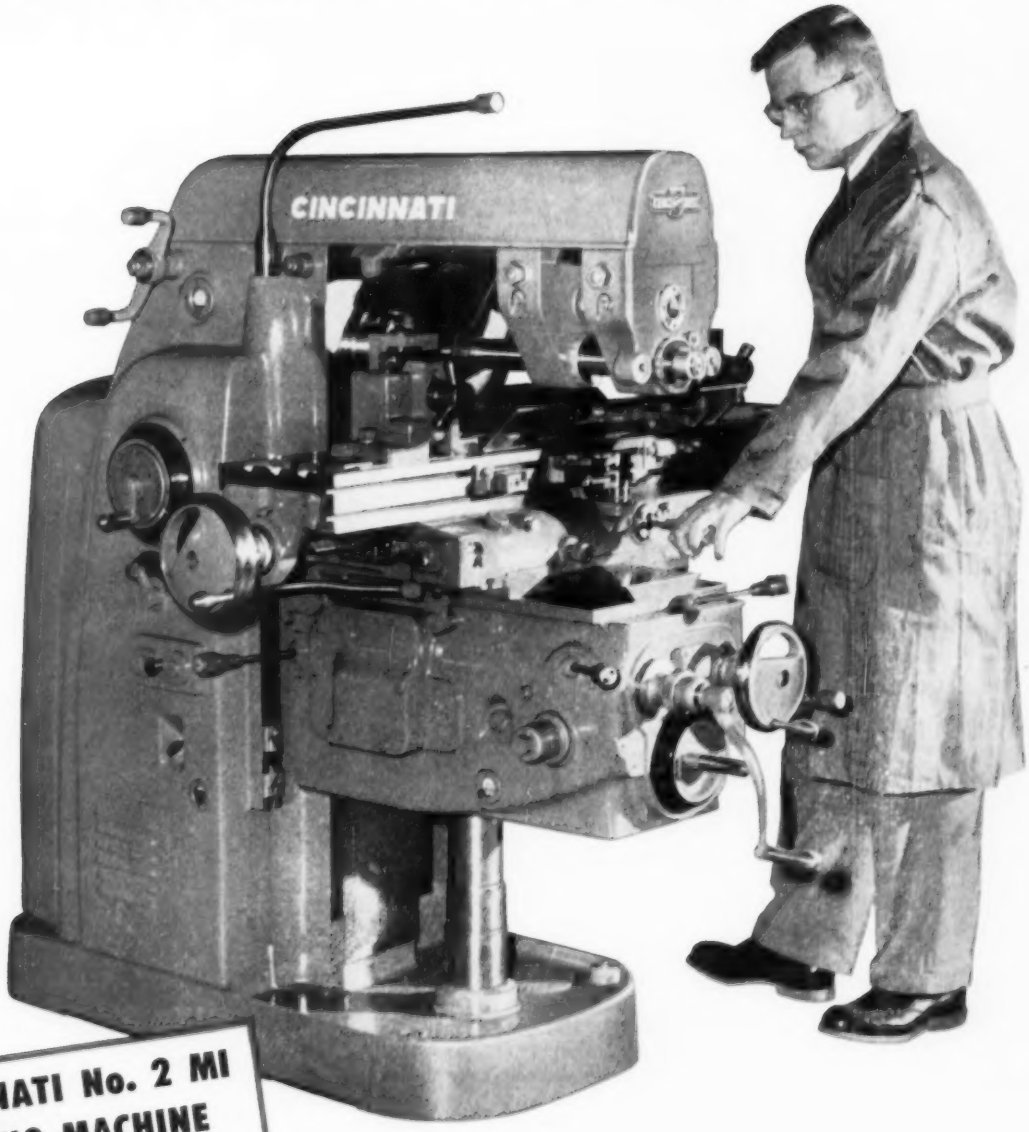
CINCINNATI



Dynapoise overarm smooths out the cutting action; provides straight-edge alignment for arbor supports

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES

Milling Machines on the Job



CINCINNATI No. 2 MI MILLING MACHINE

Catalog No. M-1916-1

CINCINNATI

HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS

FOR MILLIONS OF GEARS

...Fellows

Fellows Heliguide Hobbing Machine cuts a 37-tooth gear in SAE 4027 carburizing steel on one spindle and a 27-tooth gear on the other. Production, each spindle: 35 gears per hour.

Fellows No. 4GS Gear Shaper cuts twelve 32-tooth, 7" P.D., ⅞" face helical gears per hour or seven 15-tooth, 6" P.D., 2-1/16" face spur gears per hour. Set-up shown is for 20-tooth helical or countershaft.

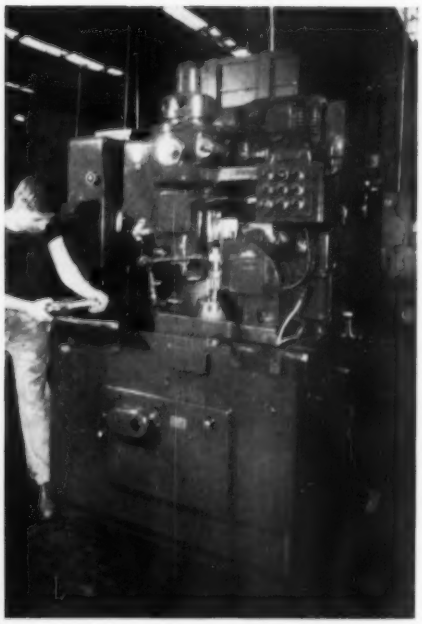
THE
PRECISION
LINE

A YEAR

Speed and Accuracy!

Over nine million gears a year for truck transmissions and other major sub-contracting jobs are made by the famous New Process Gear Company, Syracuse, N. Y. Their records show that because of their speed and accuracy their new Fellows Gear Production machines have lowered cutting costs by more than half!

For example, the Fellows Heliguide two-spindle hobbing machine at New Process cuts *six times* as many gears per hour as the previous machine. In addition, it saves approximately two hours in set-up time, requires only one operator to watch it because of its easy push-button operation. One man can operate four of these Fellows high-speed Heliguide Hobbing Machines.



New Process gets similar benefits from each of its ten Fellows No. 4GS Gear Shapers. Cutting 30% faster than the old machines, the No. 4GS Gear Shapers also hold to 25% closer tolerance without difficulty, saving on set-up time.

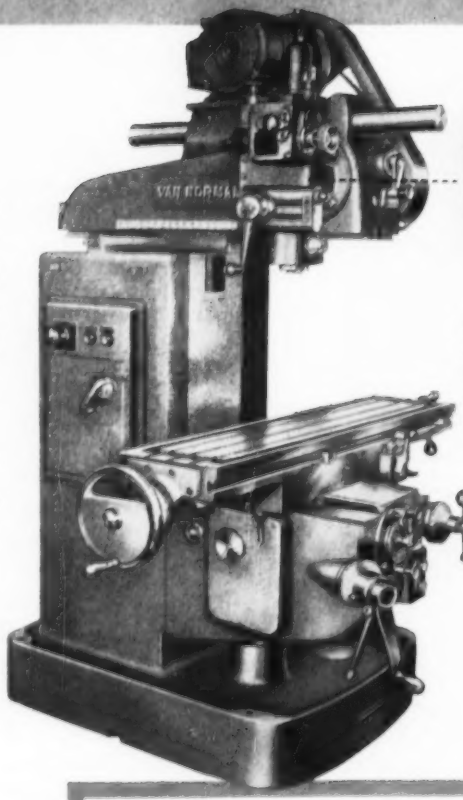
For full information about the complete Precision Line of Fellows Gear Production Equipment, get in touch with your Fellows representative. Write, wire or 'phone any Fellows Office.

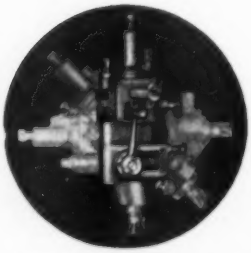
THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*

These ENTIRELY VAN NORMAN No. 16 DO THE WORK OF TWO

Save Equipment Dollars





Quill Type Adjustable Cutterhead permits horizontal, angular, and vertical milling plus boring and drilling.

These new Van Norman Ram Type Millers are designed to increase your milling production and reduce milling costs. Entirely new from top to bottom, they are engineered for maximum rigidity, cutability and accuracy.

A single investment in any one of these millers gives you the equivalent of two single purpose machines plus attachments *at the much lower cost of a single machine.*

They are available in both plain and universal models.

Write for complete details today.

Don't wait . . . for extra profits install a Van Norman Machine now! They are available on many purchase plans—Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate.

For instance — you can purchase a No. 165 on a 5 year conditional sales contract for only $4.98 per day. See your dealer or write Van Norman Company.

Conditional Sales Contracts not available to Export

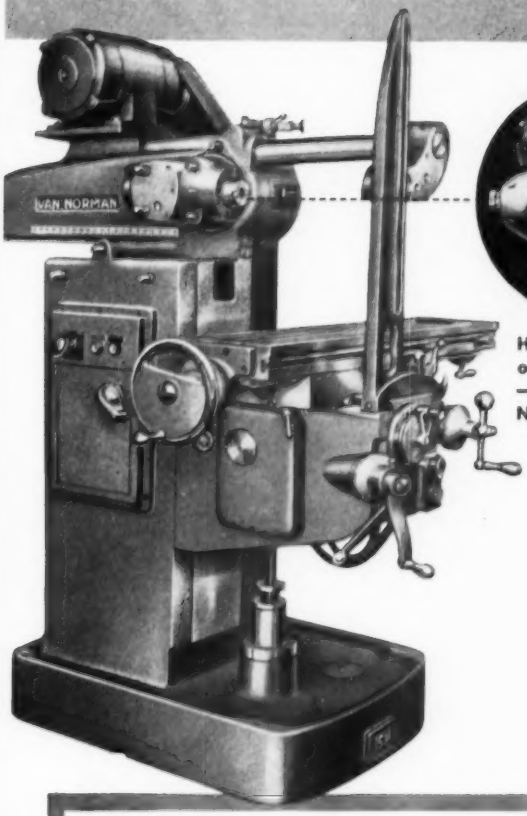
NO. 165

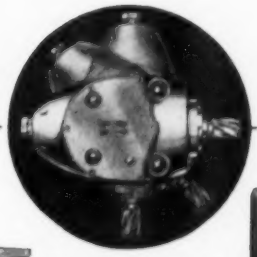
features the quill type adjustable cutterhead that makes this machine the most versatile miller available. Table: 40½" x 10"; Quill Travel: 4"; Quill Power Feeds: .0015; .003; .006; Cutterhead Spindle Motor: 2 HP.

VAN NORMAN MACHINE

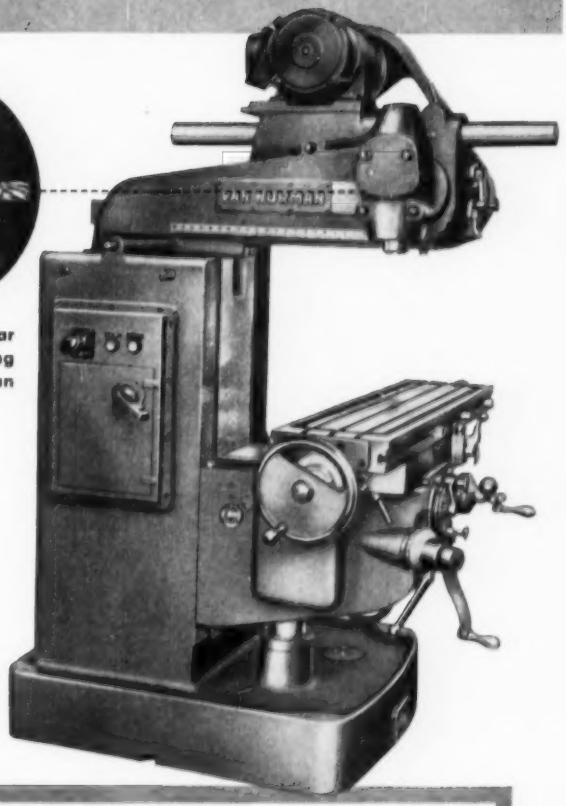
MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

NEW...
RAM TYPE MILLERS
SINGLE PURPOSE MACHINES
...Cut Production Costs!





Horizontal, angular or vertical milling — all on one Van Norman Miller.



NO. 16M

a heavy duty, rugged miller designed for maximum rigidity and accuracy. Table: 40½" x 10"; Ram Travel: 20½"; 3 HP Cutterhead Spindle Motor.

NO. 16L

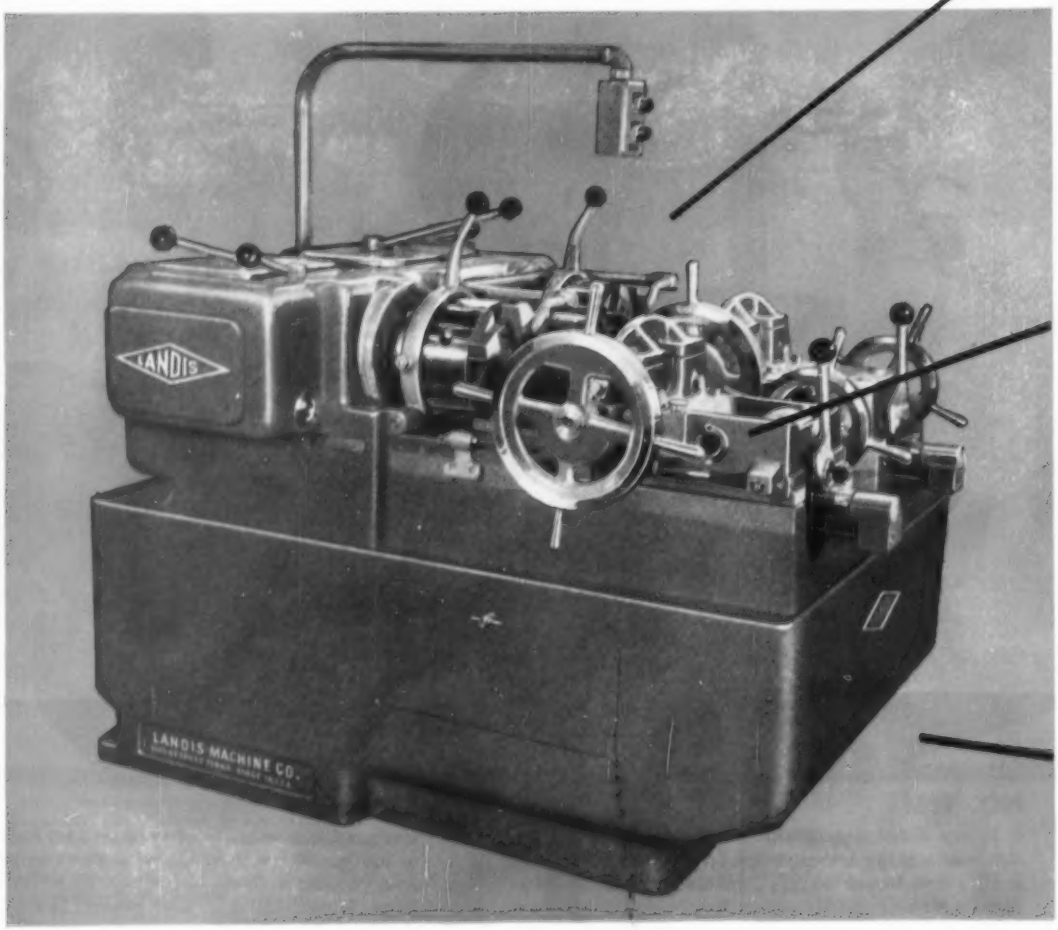
designed to increase production and cut costs in tool rooms, machine shops, pattern shops and production lines. Table 40½" x 10"; Ram Travel: 20½"; Cutterhead Spindle Motor: 2 HP.

COMPANY

SPRINGFIELD 7, MASSACHUSETTS

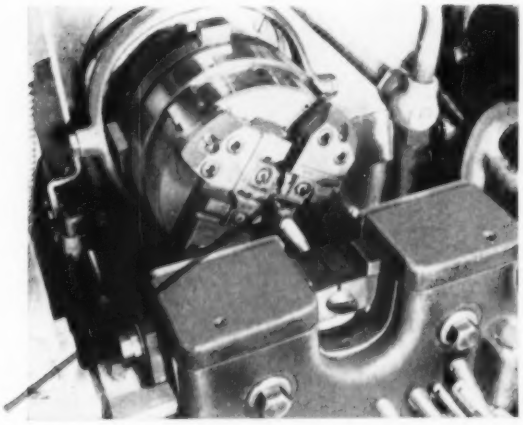
LANDMACO

threading machines



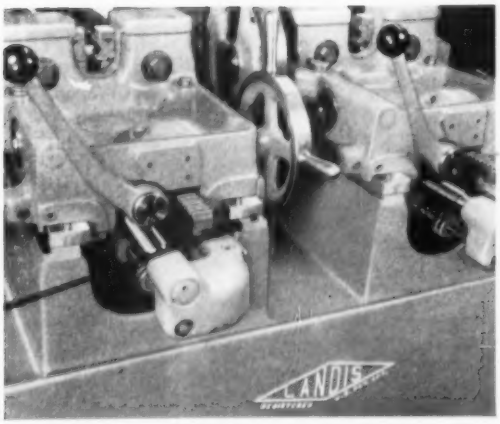
. . . . . are built in a wide variety of models for commercial, heavy duty, and precision threading from $\frac{3}{16}$" to 2½" in diameter.
Single or double-spindle models are available in varying bed lengths, with or without lead screw, using either of two die head styles, according to individual requirements. The die heads use LANDIS Tangential Chasers, which may be reground for 80% of their original length. Adaptation for oversize capacity and special jobs is easily made through auxiliary equipment.

For more information, send specifications and ask for Bulletin H-76.



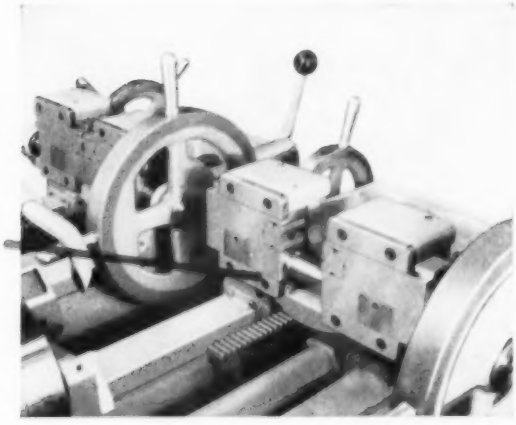
PRECISION

Hardened and Ground LANCO Die Heads combined with Lead Screw Feed enable threading to Class 4 and Class 7 tolerances. The fundamental design and specially selected and hardened materials of the die head provide the maximum rigidity required for this class work.



HEAVY-DUTY

Lead Screw Feed and rugged LANCO Heat Treated Die Heads enable the unusually heavy cuts required for producing Acme threads. Despite the heavy rate of metal removal, workpiece slippage is prevented by vise gripping power intensified by a "hammer blow" operating handwheel.



VERSATILITY

Each LANDMACO Threading Machine cuts a wide range of thread diameters—for example, the 12C LANDMACO has a standard threading range from $\frac{3}{8}$" to $1\frac{1}{2}$" in diameter, with oversize capacity to $3\frac{3}{4}$" for short thread lengths. Standard carriage vises enable the gripping of diameters larger than the machine's capacity, and special vises may be furnished. Tooling is available for Tapping, Turning, Grooving, Forming, and Facing operations.

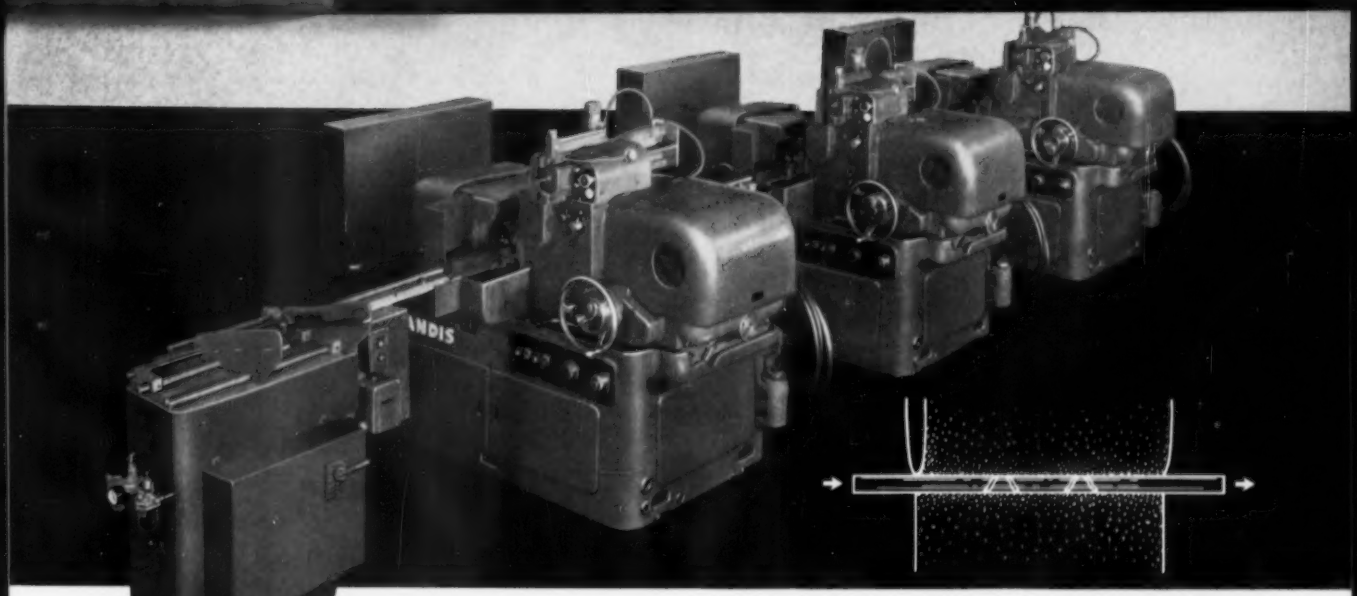
LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA

Landis ideas on automatic operation raise centerless production...increase output with no loss of accuracy

Automatic Grinding of Four Diameters and radii of universal joint spiders in one loading. Production is 250 per hour.

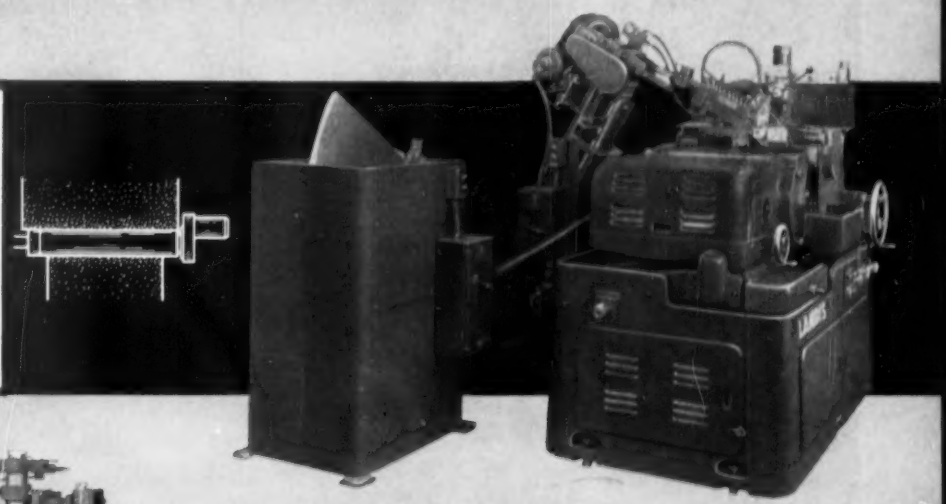
LANDIS

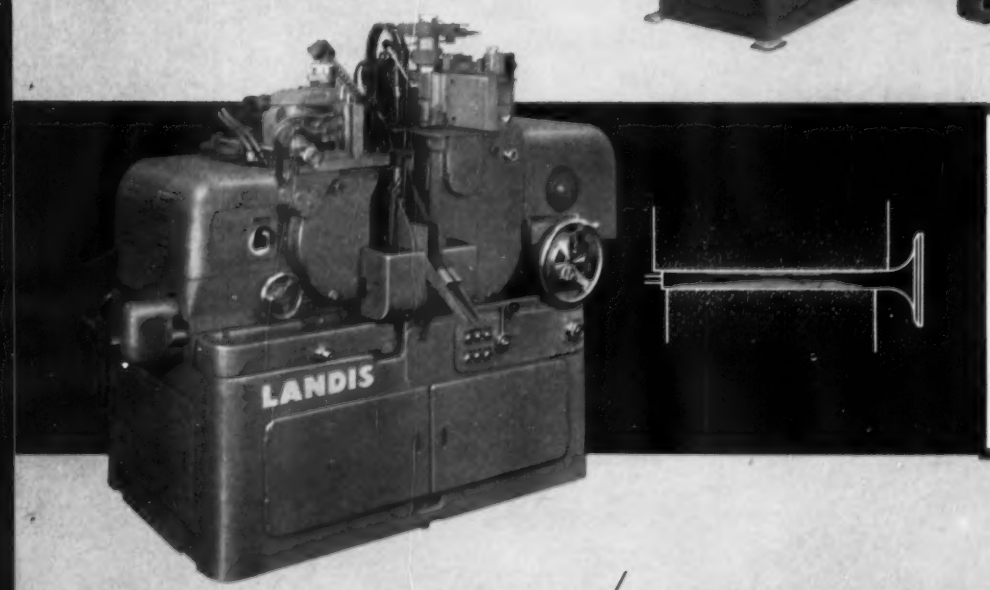
precision grinders



Automatic Grinders in Tandem for 3-operation grinding of motor shafts.

Automatic Grinding of Small Crankshaft. Production is 375 pieces per hour.

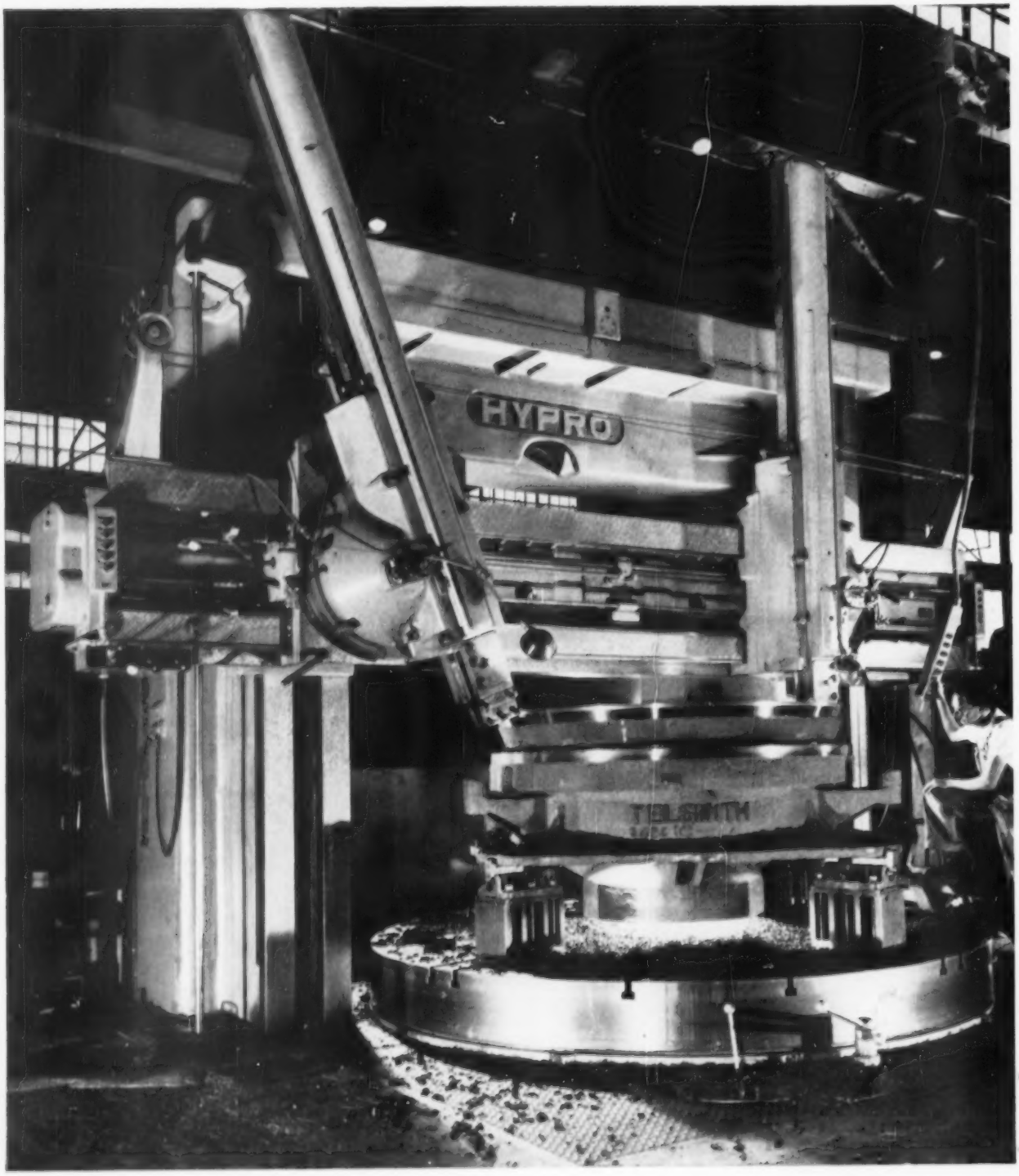




Automatic Finish Grinding of 1320 automotive valves per hour.

LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA

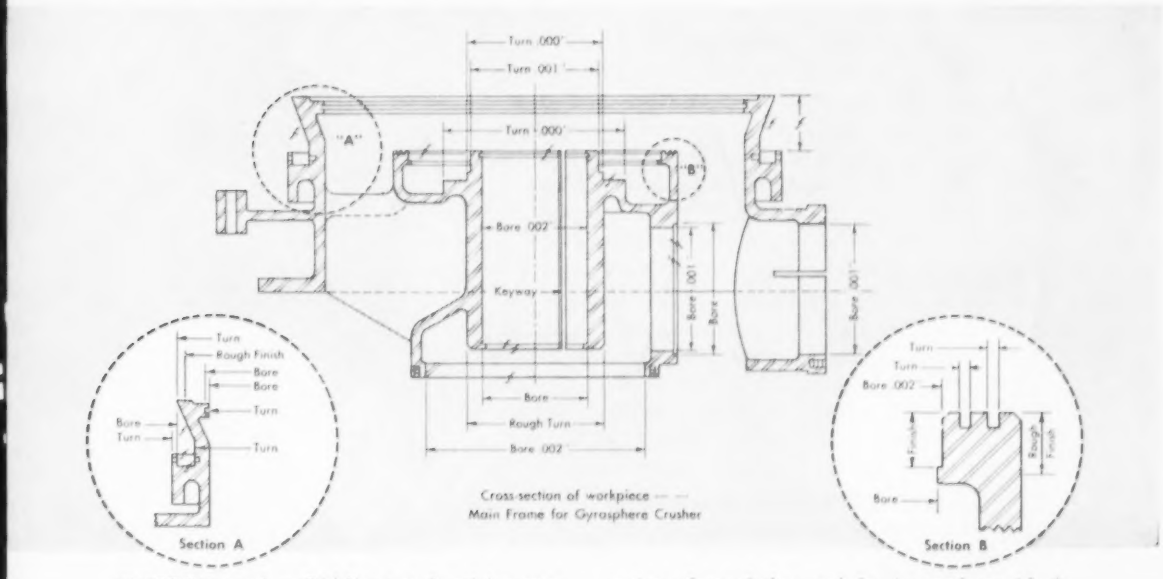
20 precision turning



and boring operations

.000" to -.002" tolerances

That's what Smith Engineering gets with a Giddings & Lewis 10-ft. Hypro Vertical Mill, machining 5½-ton, all-steel Gyrasphere main crusher frames



HERE'S another Giddings & Lewis' masterpiece of precision in action. It's a 10-ft. Hypro Vertical Boring and Turning mill that's on the job every day at the Smith Engineering Works, Milwaukee. Extremely versatile and accurate, this boring mill turns and bores 20 different diameters on the hi-carbon, cast-steel main crusher frame — 7-ft. wide, 3'4½" high, weighing 5½ tons. Inside and outside diameters at different height are machined to precise tolerances — .000" to −.002".

There's a good reason for this kind of precision performance. You'll find it in G&L's advanced design and operating features, such as non-metallic ram and saddle bearings that resist abrasive action of metal dust and forging scale, residual heat, etc. No more chatter, cutter breakage and vibration so harmful to precision machining.

G&L Hypro Vertical Boring and Turning mills are available with an electronic tracer control system, plus a wide range of optional operating features. They're built in 12 standard models with capacities ranging from 54" to 12'.

Remember, if you're considering buying a new vertical boring mill, it will be profitable for you to get in touch with your G&L representative today, or write direct to factory.

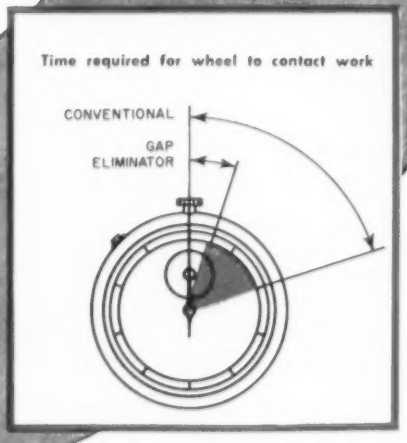
Write for this 42-page catalog, describing and illustrating G&L's broad line of Hypro Vertical mills. Ask for Catalog No. 54-12.

G&L *and* HYPRO DIVISION
GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

G-62

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; HYPRO Double Housing and Openside Planers; Planer-Type Milling Machines, Vertical Boring Mills, Spar and Skin Milling Machines, and VARIAX Machines.

Where Seconds



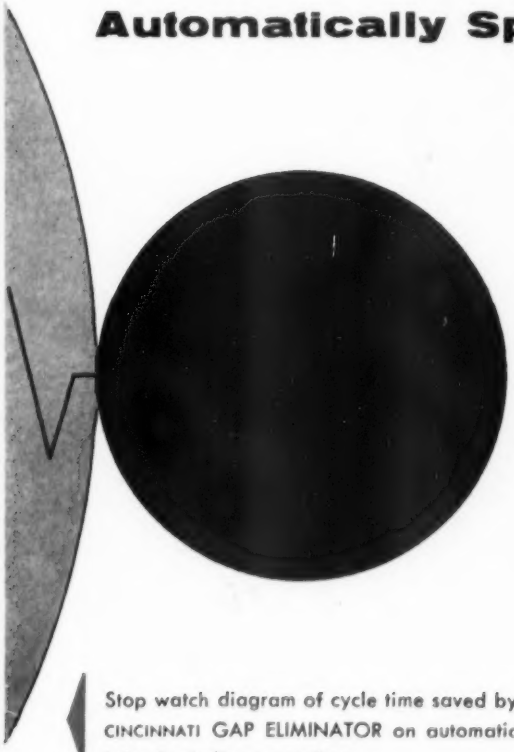
FILMATIC

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE

Count ...and grinding stock varies

Cincinnati Gap Eliminator Automatically Speeds up the Cycle



Stop watch diagram of cycle time saved by CINCINNATI GAP ELIMINATOR on automatic infeed grinding operations

Variations in grinding stock are inevitable. And the wider the variation, the longer will be the cycle for automatic infeed grinding operations . . . more time is lost in "grinding air." Cincinnati has eliminated much of this unproductive time with an exclusive feature—GAP ELIMINATOR—which can be built into most new CINCINNATI® FILMATIC Grinding Machines. Briefly, here's how it works:

> The wheelhead advances toward the work at a rapid rate. At a predetermined point in the cycle, the rapid rate changes to an intermediate infeed rate. Instantly upon contact of the wheel and work, the normal grinding rate takes over, and the cycle continues to completion.

A few seconds saved each cycle can mean big dollar savings on your cost records. It will pay the management of every metalworking shop concerned with precision grinding to find out more about the GAP ELIMINATOR feature available for CINCINNATI FILMATIC Grinding Machines. ¶ Ask for a visit by one of our field engineers. Chances are he can show you how to save money on your precision grinding operations.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI FILMATIC 6"R x 18" Plain Hydraulic Grinder

GAP ELIMINATOR, Push-Button Automatic Infeed, Air-Electric Gage Sizing (with Cycle Time Stabilizer) and other cost-reducing features are included in the CINCINNATI FILMATIC 6"R x 18" Plain Hydraulic Grinder illustrated at the right. There are four sizes in the line:

Size	Between-Center Lengths	Catalog
6"R } 10"L }	18" and 30"	G-660-1
10"R } 14"L }	18", 36", 48" 72" and 96"	G-661

CINCINNATI

GRINDING MACHINES • CHUCKING GRINDERS • MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES

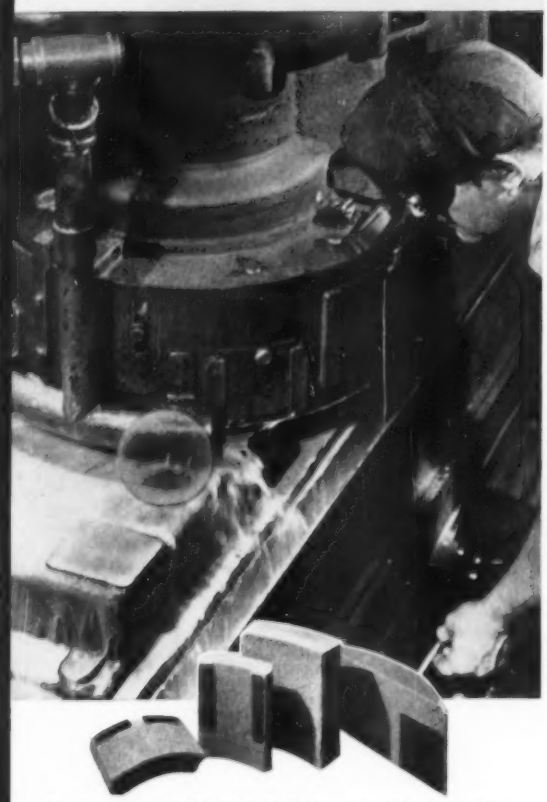
The Famous Norton G Bond is the most efficient vitrified bond ever developed for precision and semi-precision grinding. Wheels made with it bring you these "Touch of Gold" advantages: Cooler, faster cutting action . . . heavier cuts without burning . . . closer tolerances and smoother finishes . . . easier dressing and more pieces per dressing . . . more work, and more kinds of work, per wheel.

Big surface grinders pay off big

. . . with the G BOND-32 ALUNDUM* combination

Your Big Surface Grinders — like Blanchard, Hanchett, Mattison and Thompson machines—take deep cuts into grinding costs when you use Norton G Bond-32 ALUNDUM wheels or segments. See your Norton Distributor for details. Ask him about other popular Norton abrasives, including 19 ALUNDUM, 38 ALUNDUM and CRYSTOLON* abrasives. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

W-1717



Norton 32 ALUNDUM Abrasive is another "Touch of Gold" advancement in grinding progress. It grinds exceptionally cool and fast, with minimum dressing, and is ideal for fast stock removal and heavy feeds. The G Bond-32 ALUNDUM abrasive combination is further proof that only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost.

NORTON
ABRASIVES

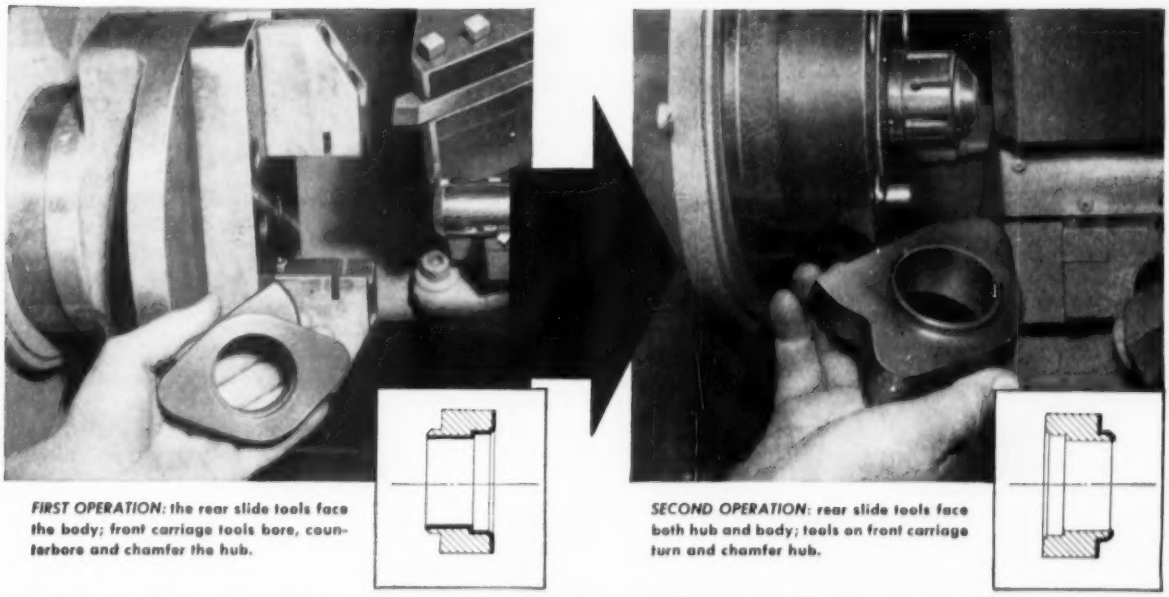
Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cut Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Quick "pass-along" idea

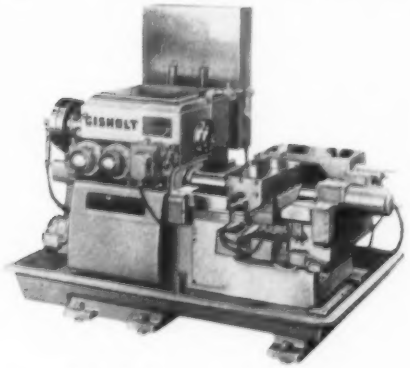
INCREASES PRODUCTION



FIRST OPERATION: the rear slide tools face the body; front carriage tools bore, counterbore and chamfer the hub.

SECOND OPERATION: rear slide tools face both hub and body; tools on front carriage turn and chamfer hub.

with pair of GISHOLT No. 12 Hydraulic Automatic Lathes



The Gisholt No. 12 Hydraulic is a versatile 12" Automatic Lathe which combines speed and accuracy with easy setup. Ideal for both chucking and between-centers work.

One operator with two standard machines now handles these cast iron manifold bodies in rapid succession—at a pace of 80-per-hour, at 80% efficiency.

This two-machine team pays off many ways: The operator loads and unloads one machine while the other is working—*automatically.* Investment is at a minimum because both machines *and* tooling are standard. Tool setups and replacements are simple.

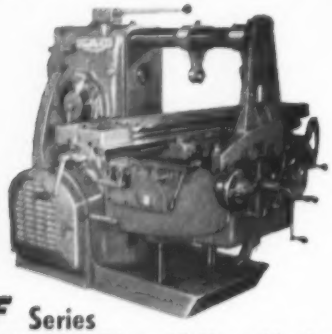
Whether you have continuous runs like this or even smaller job lot work—the speed and automatic operation of the Gisholt No. 12 Hydraulic may be your answer to lower costs. It's worth investigating.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Backbone for any job...

New Kearney & Trecker TF Series milling machines have it . . . backbone for the precise tool room job and "plenty of beef" for rugged duty milling



TF Series
Model 210 Plain Milling Machine

POWER — 10hp spindle drive; 3hp feed and rapid traverse drive
TABLE WORKING SURFACE — 62" x 14"
FEEDS — (32) ⅛ to 90 ipm
SPEEDS — (24) 15 to 1500 rpm
WEIGHT — 9200 lbs.

New TF Series milling machines are available under Tool-Lease program

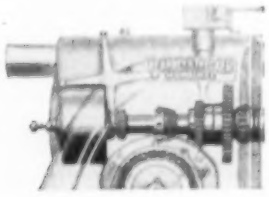
THE solid-back column is an outstanding example of Kearney & Trecker advanced engineering. This one-piece, cross-ribbed, solid-back column is the most important single element of the machine. Every inch of metal is scientifically distributed to add rigidity where it's needed the most. Thus the column readily absorbs all the heavy work loads supported by the heavier, wider knee, and also all torsional thrusts to the cutter transmitted through the heavy-duty, three-bearing spindle and double overarms.

What's more, the heavier column base is specially designed for the new, exclusive twin screw knee support — the only balanced-design arrangement offered today.

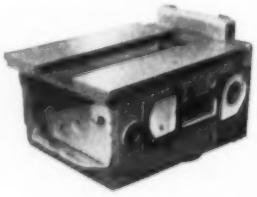
In addition, the new TF's give you other outstanding design and operating features, never before available on any knee-type milling machines. They're built in five sizes — No. 2 to No. 6 from 10hp to 50hp in Plain, Universal and Vertical styles.

For facts and figures that will help you — ask about TF's — the latest in milling machines. Contact your Kearney & Trecker representative — call him or mail coupon direct to factory today.

A few more of many reasons why TF Series milling machines are way out front in rigidity



Three-Bearing Spindle — Complete assembly consists of three heavy-duty bearings, flywheel, train of wide-faced forged steel gears. Rigidity of spindle unit contributes to increased cutter life . . . excellent finish . . . quieter and vibrationless operation.



Heavier, Wider, One-Piece Knee — The twin screw arrangement supports the heavier, larger knee. Span and length of ways are increased considerably, providing fuller saddle support . . . long-lasting accuracy.

Twin Screw Knee Support — Exclusive double-support arrangement most effectively distributes weight of new machines' much larger, wider, heavier knee, saddle and table. This balanced design substantially increases stability under heaviest loads . . . offers greater resistance to torsional thrust under all cuts . . . halves the wear factor, assuring greater, longer-lasting accuracy.

KEARNEY & TRECKER CORP.
6786 W. National Ave., Milwaukee 14, Wisconsin

Please send me Catalog No. TF-50 with details on the new line of TF Series Plain, Universal and Vertical milling machines.

Name .....

Title .....

Company .....

Address .....

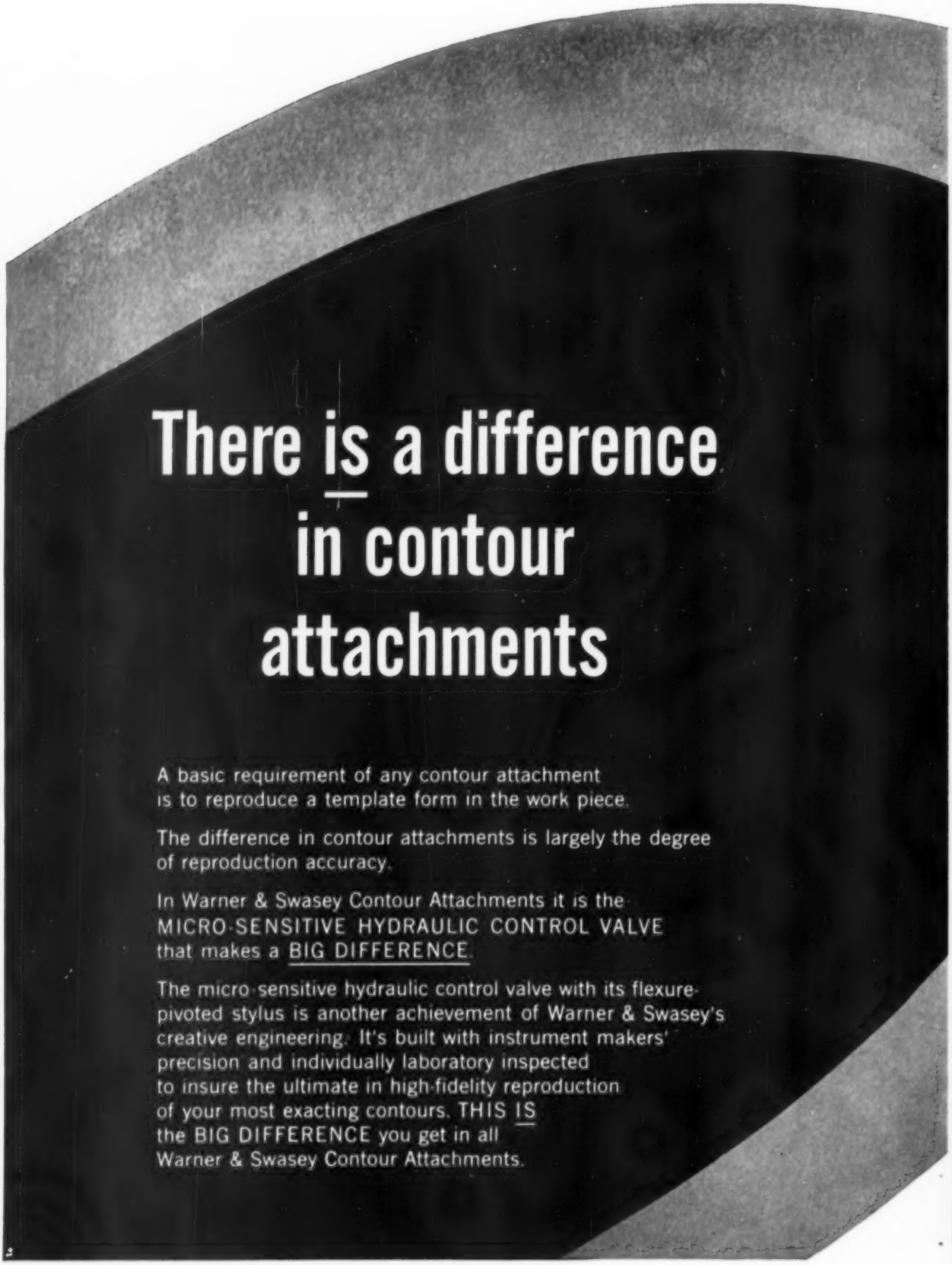
City ..... Zone ..... State .....

"Solid-Back" Column

See our catalog in S or write for copy

KEARNEY & TRECKER
MILWAUKEE

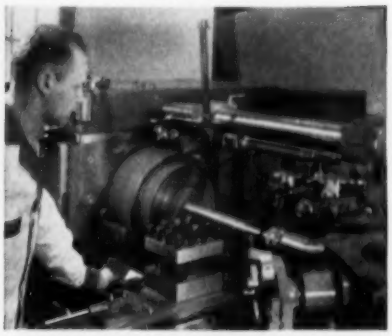
DESIGNERS AND BUILDERS OF PRECISION AND PRODUCTION MACHINE TOOLS SINCE 1898


There is a difference
in contour
attachments
A basic requirement of any contour attachment is to reproduce a template form in the work piece.
The difference in contour attachments is largely the degree of reproduction accuracy.
In Warner & Swasey Contour Attachments it is the MICRO-SENSITIVE HYDRAULIC CONTROL VALVE that makes a BIG DIFFERENCE.
The micro-sensitive hydraulic control valve with its flexure-pivoted stylus is another achievement of Warner & Swasey's creative engineering. It's built with instrument makers' precision and individually laboratory inspected to insure the ultimate in high-fidelity reproduction of your most exacting contours. THIS IS the BIG DIFFERENCE you get in all Warner & Swasey Contour Attachments.

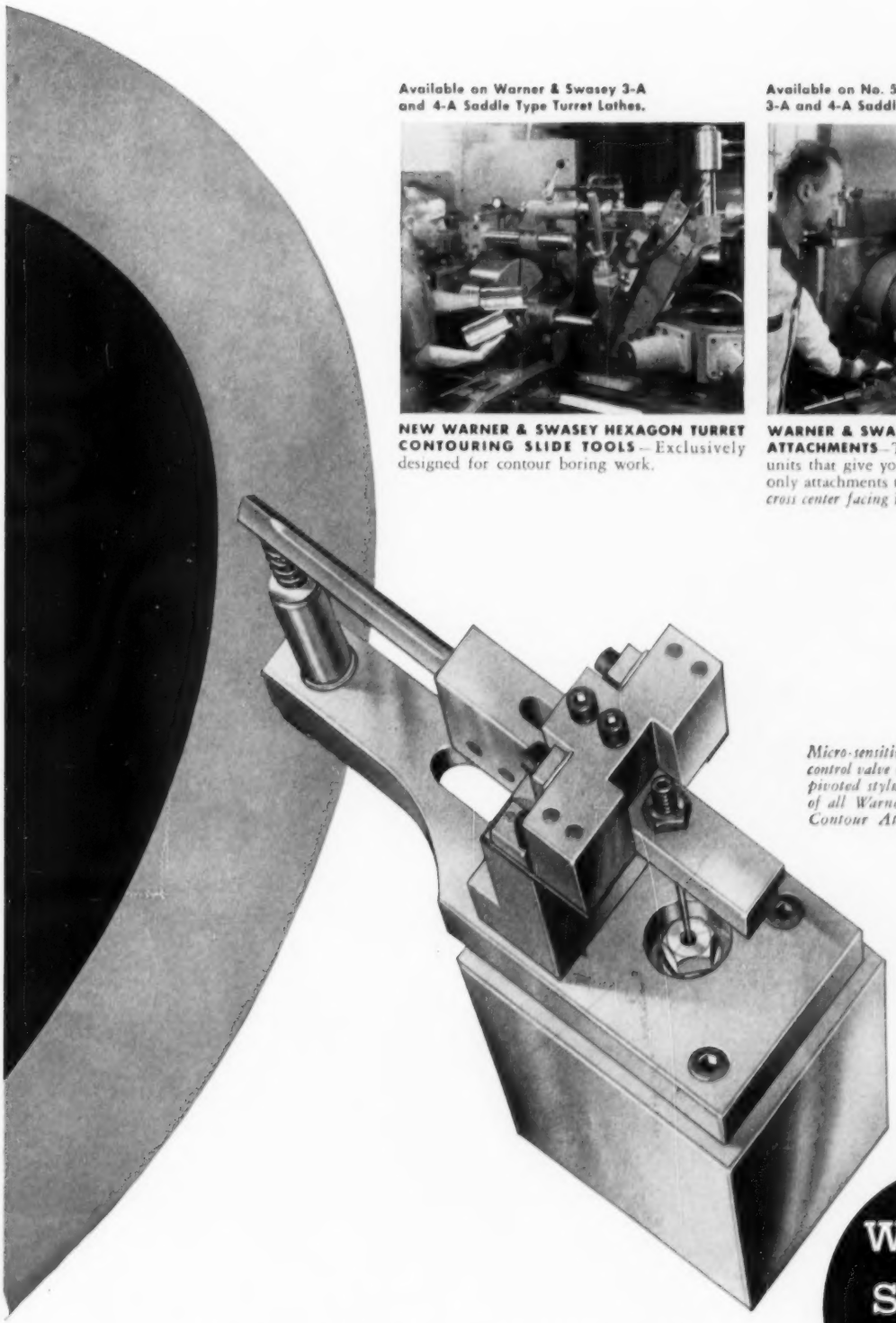
Available on Warner & Swasey 3-A and 4-A Saddle Type Turret Lathes.

NEW WARNER & SWASEY HEXAGON TURRET CONTOURING SLIDE TOOLS—Exclusively designed for contour boring work.

Available on No. 5 Ram Type and 2-A, 3-A and 4-A Saddle Type Turret Lathes.



WARNER & SWASEY CROSS SLIDE CONTOUR ATTACHMENTS—The only turret lathe contour units that give you *cross center facing*. Also, the only attachments that give you both *turning* and *cross center facing* in one unit.



Micro-sensitive hydraulic control valve with flexure-pivoted stylus—the heart of all Warner & Swasey Contour Attachments.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...

WITH A WARNER & SWASEY

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

5
Here's why
"THE

Men in 1

that's your MFD*

He's a TAP man
He's a DRILL man
He's a CUTTER man
He's a REAMER man
He's a CARBIDE man
He's a Complete tool man

*your MORSE-FRANCHISED DISTRIBUTOR

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.
Subsidiary of VAN NORMAN INDUSTRIES, INC.
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco • Buy tools by phone from your Morse Franchised Distributor and save ordering time

MORSE means MOST" in Cutting Tools

Roller Bearing Retainers

LAPOINTE · BROACHED at the rate of

The low-cost way to get a smooth inside job

Production rolls right along at a rapid rate, in one of America's largest plants making outboard motors! And no wonder, for the production-minded executives have found that conversion to Lapointe-Broaching for their roller bearing retainers gave them the **right answer** to a difficult machining job.

Built especially for mass production of small precision parts, and available in 10- to 25-ton capacity, 36″ to 60″ stroke, this compact machine is just right for broaching bushings, piston pins, shock absorber tubes, small cylinders, small gear blanks and similar production parts. On that class of work it will **out-produce any other type of machine!**

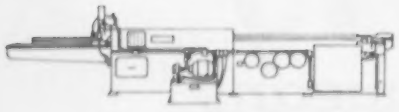
Very probably you are making parts in your plant right now where Lapointe-broaching would save you money while at the same time increasing your production and improving your quality. We suggest that you ask a Lapointe field engineer to talk with you.

THE LAPOINTE MACHINE TOOL COMPANY

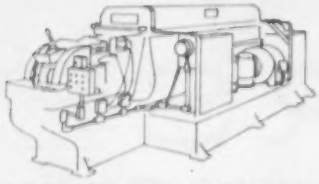
HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

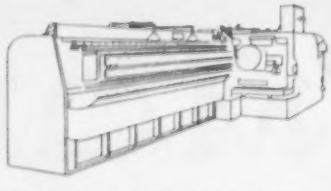
Here's a line of ELECTRO-MOTIVE DRIVE BROACHING MACHINES . . . . . available only at LAPOINTE



60″ STROKE HORIZONTAL, ELECTRIC



CH CONTINUOUS BROACHING, ELECTRIC



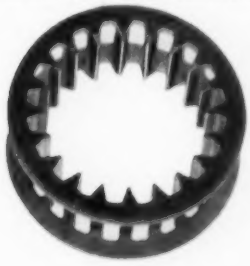
SRHE SINGLE RAM HORIZONTAL, ELECTRIC

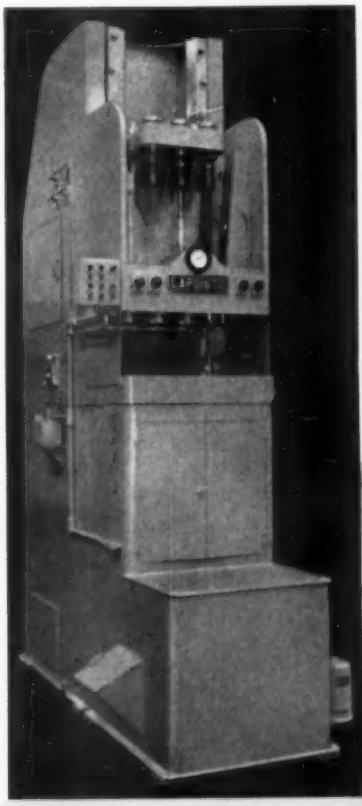
360 parts per hour!
(at 80% efficiency)

ORIGINAL BLANK

AFTER 1st BROACHING OPERATION

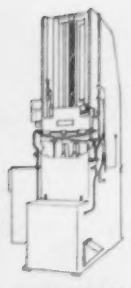
AFTER 2nd BROACHING OPERATION



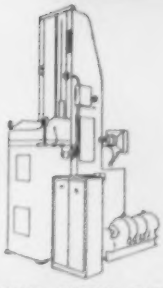


The Lapointe VU-3 Vertical Pull-Up Broaching Machine is equipped with a 3-station fixture with interchangeable parts, to accommodate two different pieces. Hydraulically-operated jaws prevent the part from collapsing during the broaching operation. Extreme rigidity is built into this machine! This rigidity assures broaching accuracy to close tolerances, and also minimizes chatter — thus lengthening the life of the broaches between grinds. Built with variable speed, and with a short stroke. The loading height is low, and the operator has all controls within easy reach. Chip chutes at the right and left sides of the base provide for easy chip removal.

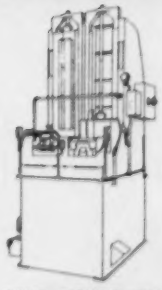
Closeup view of the hydraulically-operated fixtures, on Lapointe VU-3 Broaching Machine.



VUE-7 VERTICAL PULL-UP ELECTRIC



SRVE SINGLE RAM VERTICAL, ELECTRIC



DRVE DOUBLE RAM VERTICAL, ELECTRIC

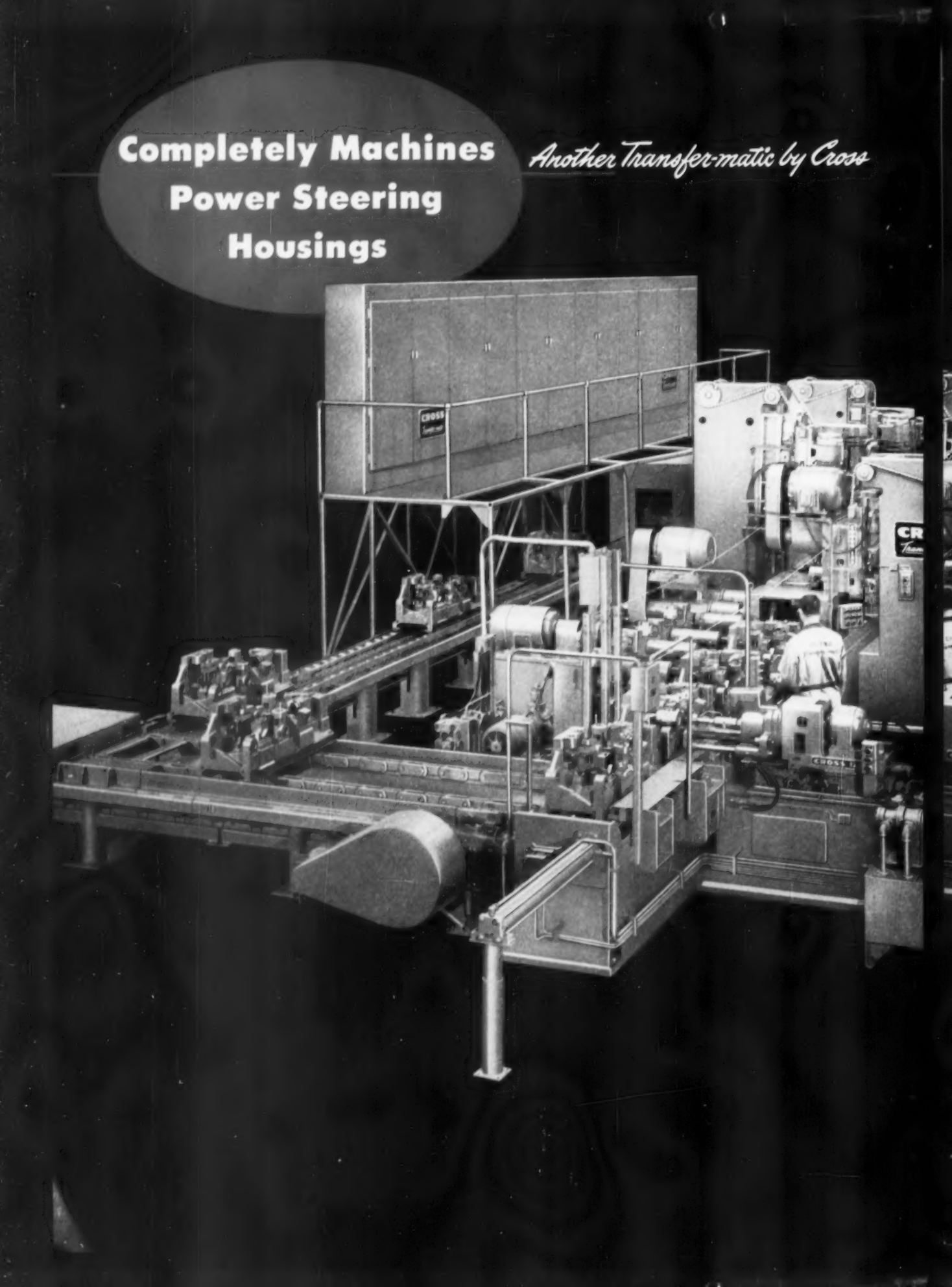
LAPOINTE

known to be the best in

BROACHING

Completely Machines Power Steering Housings

Another Transfer-matic by Cross



- ★ 156 pieces per hour at 100% efficiency.
- ★ 13 stations: 2 for loading and unloading and 11 for boring, drilling, tapping and burnishing.
- ★ Two-position, progressive type, palletized work holding fixtures for carrying parts from station to station.
- ★ Multiple spindle power wrenches to automatically clamp and unclamp work holding fixtures.
- ★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance.
- ★ Other features: Construction to JIC standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling, boring; individual screw feed for tapping; automatic lubrication.

Established 1898

THE CROSS CO

First in Automation

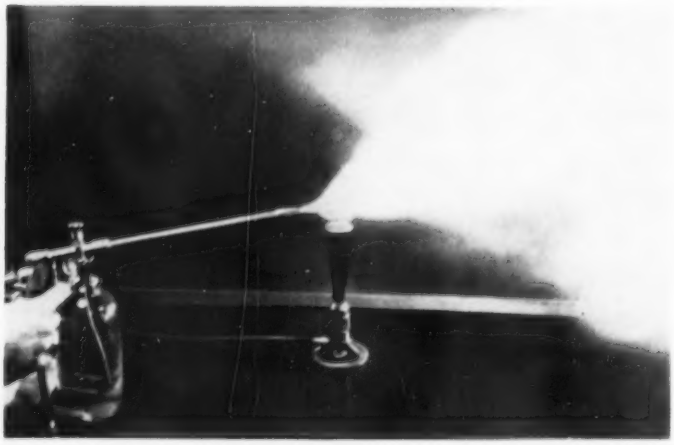
DETROIT 7, MICHIGAN

Announcing...the First

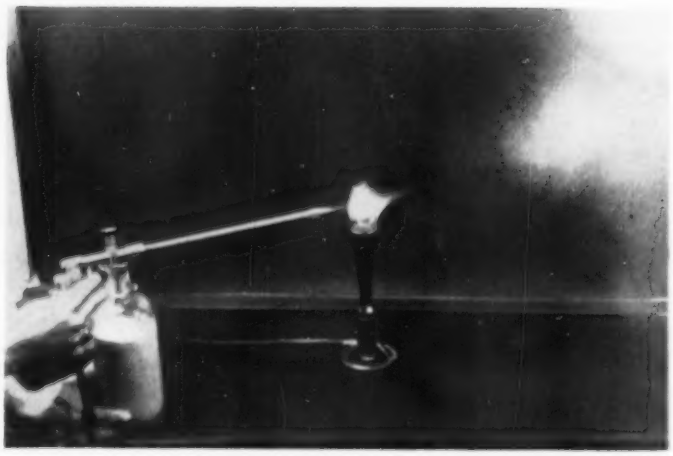
HYDRAULIC

Flame tests prove its fire-snuffing ability

This photo shows the instant combustion taking place when a conventional hydraulic oil of mineral oil type is atomized over a Bunsen burner.



In this photo, Shell Irus Fluid 902 replaces the mineral oil. Note that there is no ignition.



SHELL IRUS FLUID 902

Oil-Base fire-resistant FLUID

SHELL IRUS FLUID 902

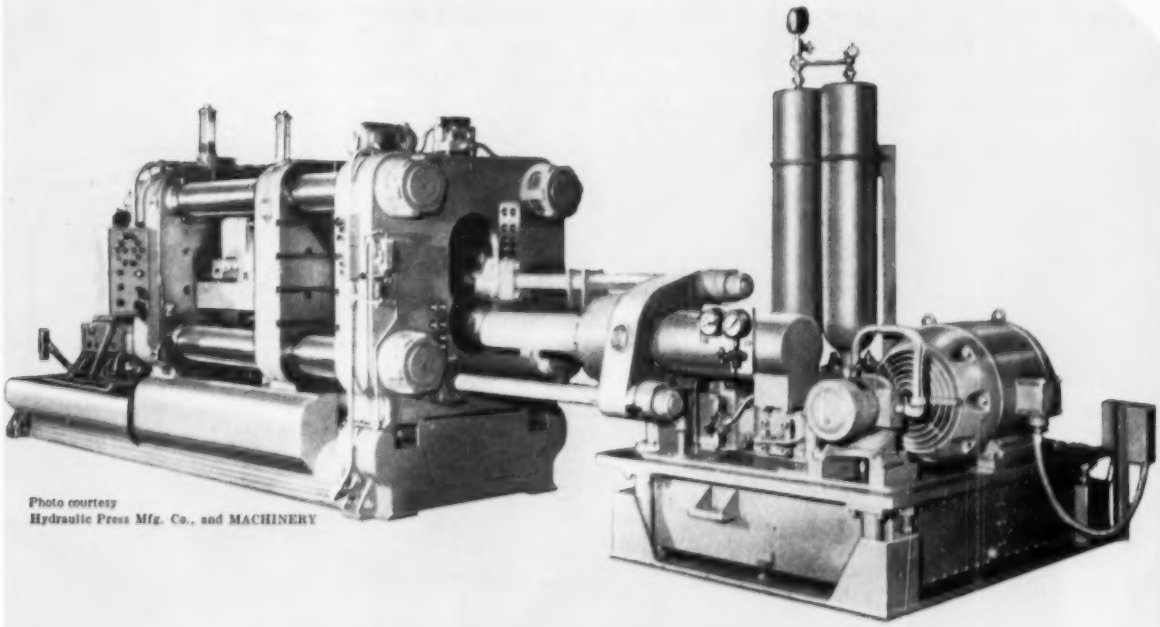


Photo courtesy
Hydraulic Press Mfg. Co., and MACHINERY

AFTER THREE YEARS of intensive research, field application and evaluation, Shell Irus Fluid 902 is now commercially available for use in industrial hydraulic systems. While its cost is far lower than other fire-resistant fluids, its performance is comparable.

No major modification of equipment is necessary. Shell Irus Fluid 902 is a special formulation containing no corrosive ingredients . . . no adverse effect on seals or fittings. It is a direct replacement for hydraulic oils now in service.

Noncorrosive, and nonrusting. Steel and copper panels immersed in Irus Fluid 902 for one week at 160°F have shown no significant signs of corrosion. Rusting has not been a problem in long-continued field tests.

This is an efficient fire-snuffing hydraulic fluid that can be widely used. Send coupon for details.

SHELL OIL COMPANY

50 WEST 50 STREET, NEW YORK 20, NEW YORK

100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

SHELL OIL COMPANY
50 West 50th St. New York 20, N. Y. or 100 Bush St. San Francisco 6, Cal.

Please send me test data and information on Shell Irus Fluid 902.

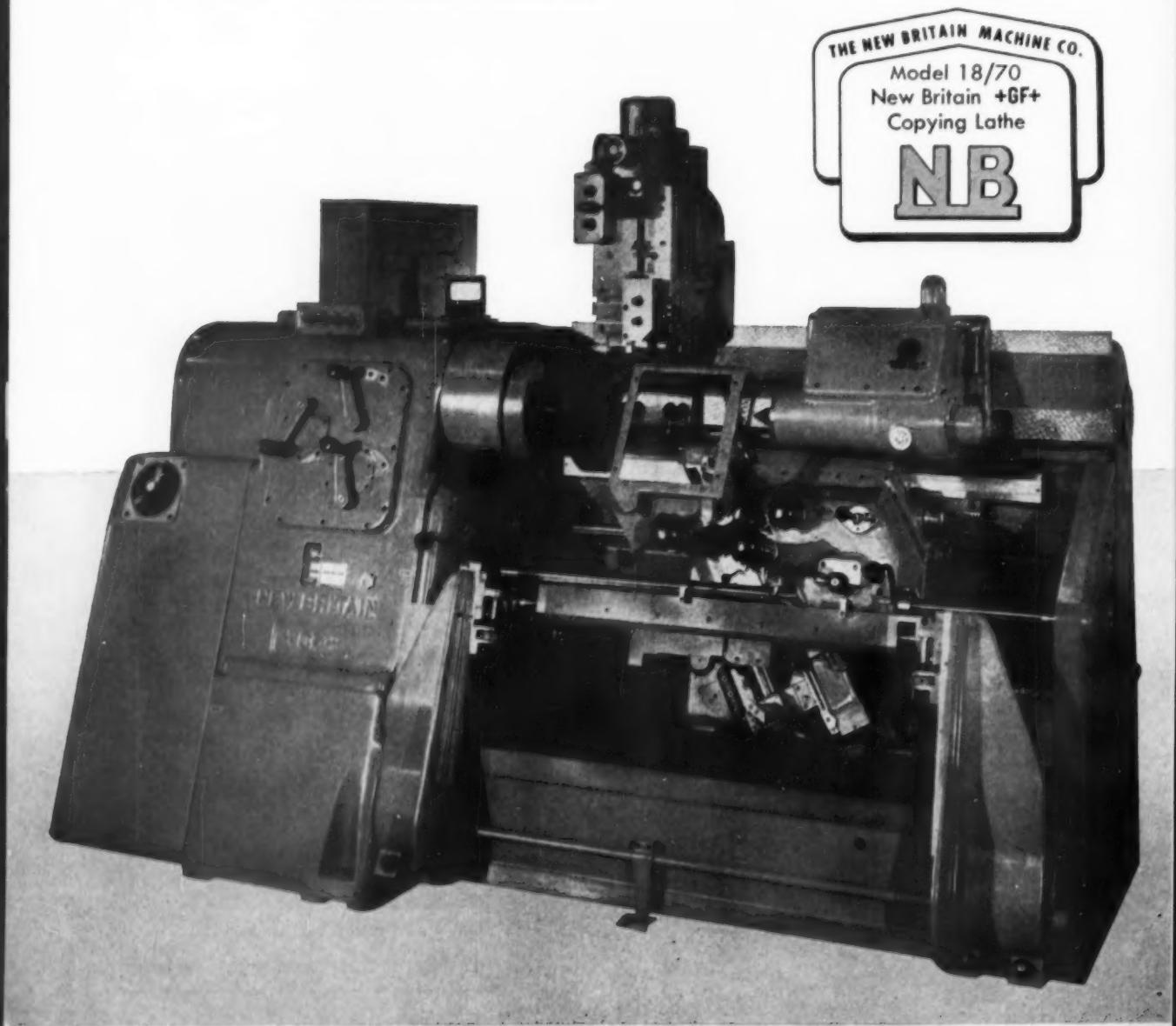
Name_____

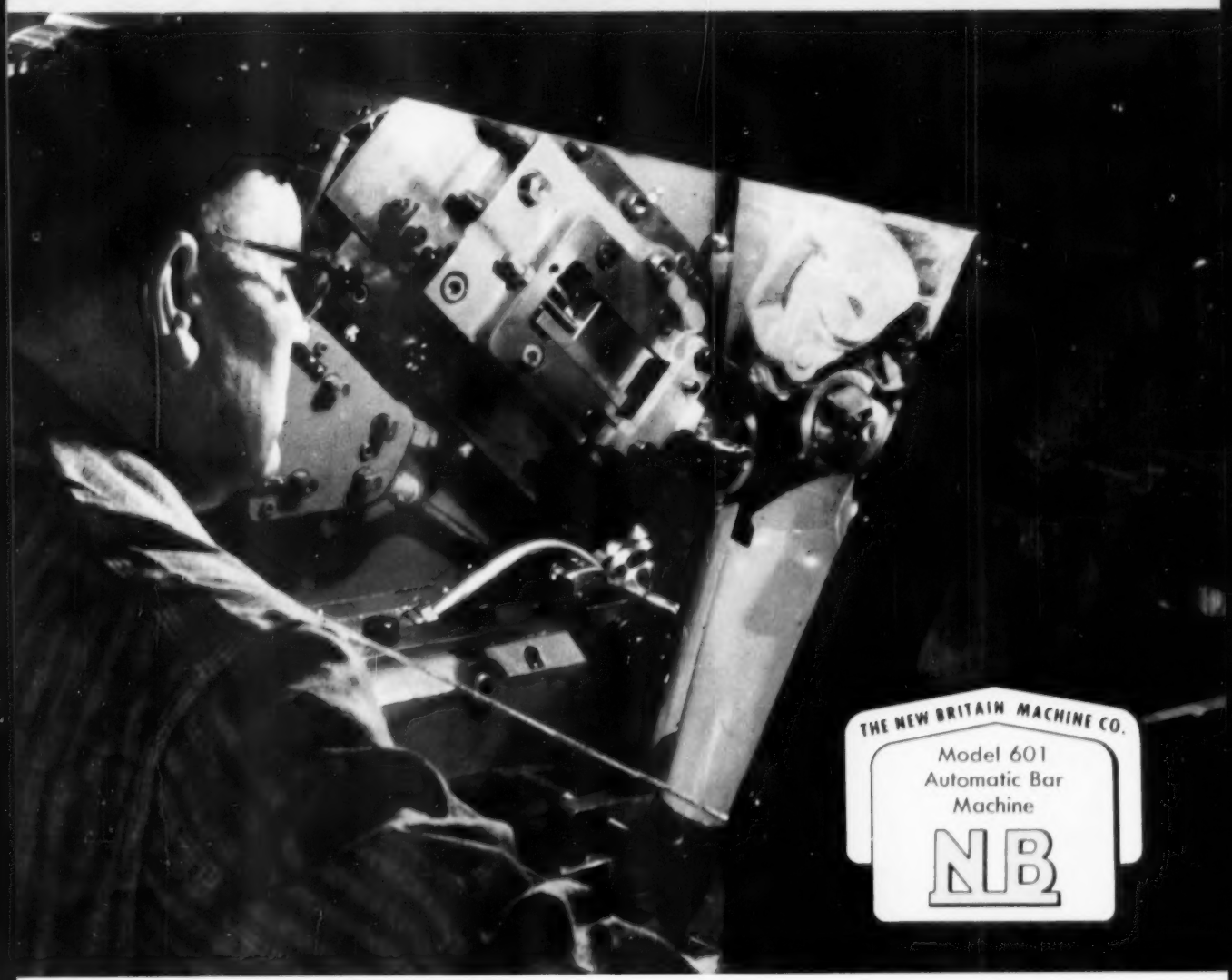
Company_____

Address_____

investigate a brand new approach to turning

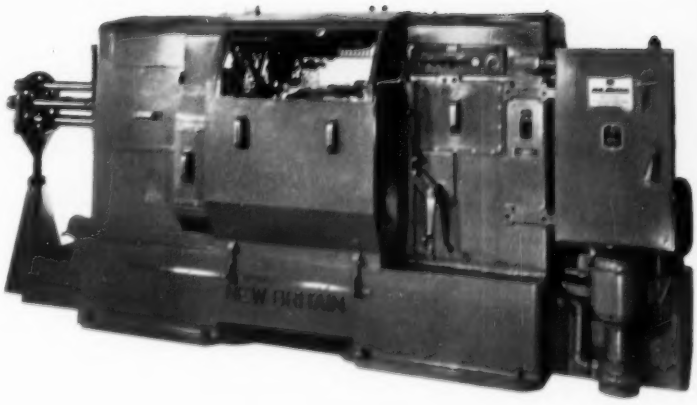
On this New Britain +GF+ Copying Lathe, you can make an accurate first piece from a blueprint—then *copy* it accurately a million times if your requirements call for it. New Britain can supply automatic loading too, if it makes sense on your work. Let us give you the complete story of this new contour approach to turning in a color motion picture demonstration in your office. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

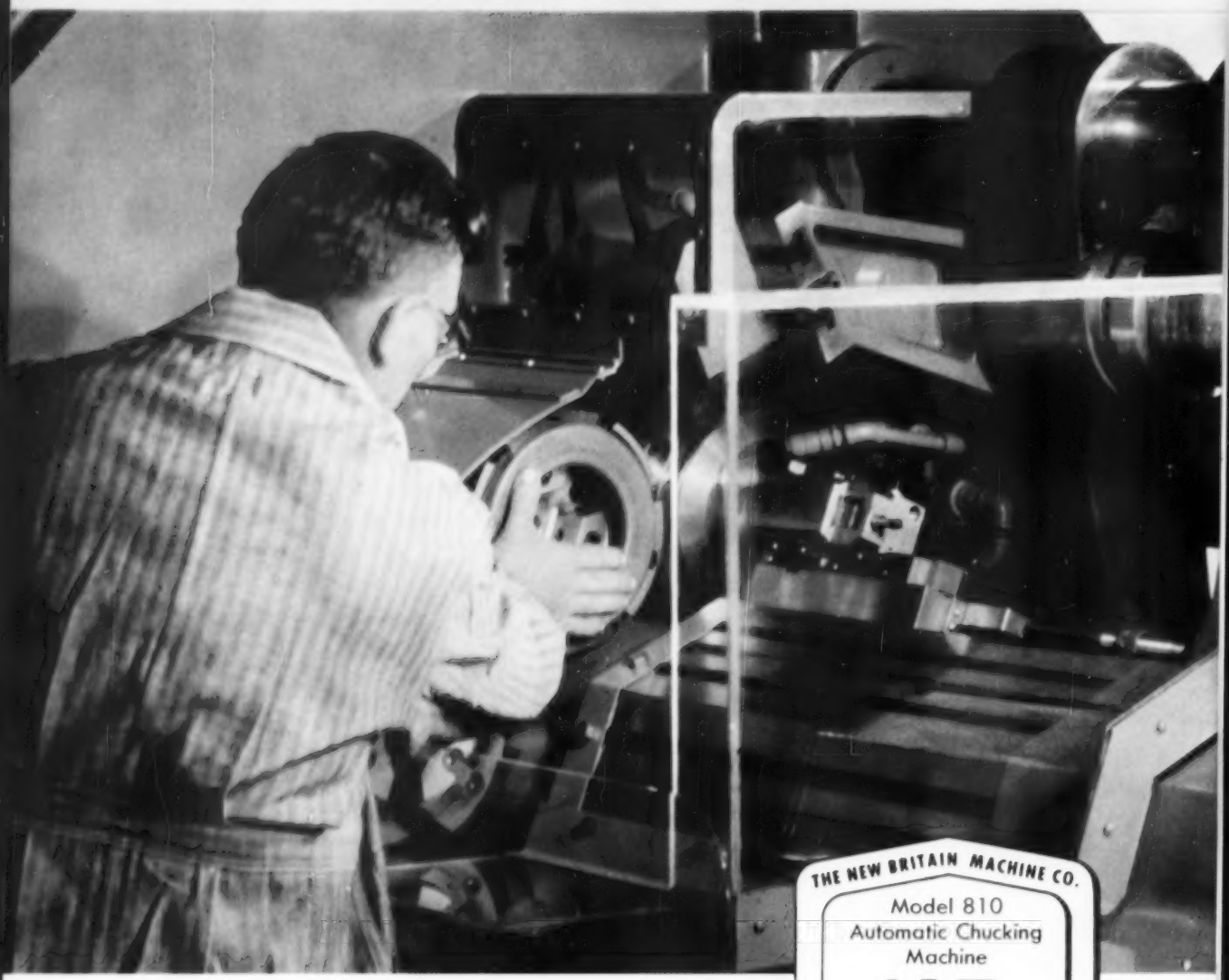




8 tons of metalworking efficiency

If you are interested in absolute minimum cost per piece on either long or short runs, investigate the Model 601 New Britain bar machine. Massive enough and powerful enough to handle your new high-speed cutting requirements. Super-high spindle speeds, maximum versatility, optional universal tool slide cam which eliminates cam change time. With the Model 601 on your floor you have "the shortest distance" between bar stock and finished piece. Write for Bulletin 6H.



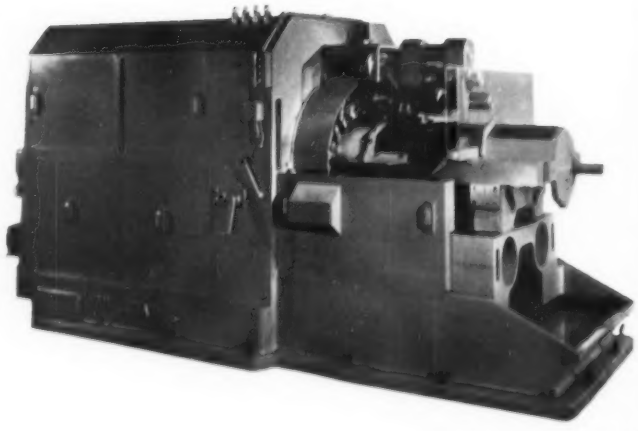


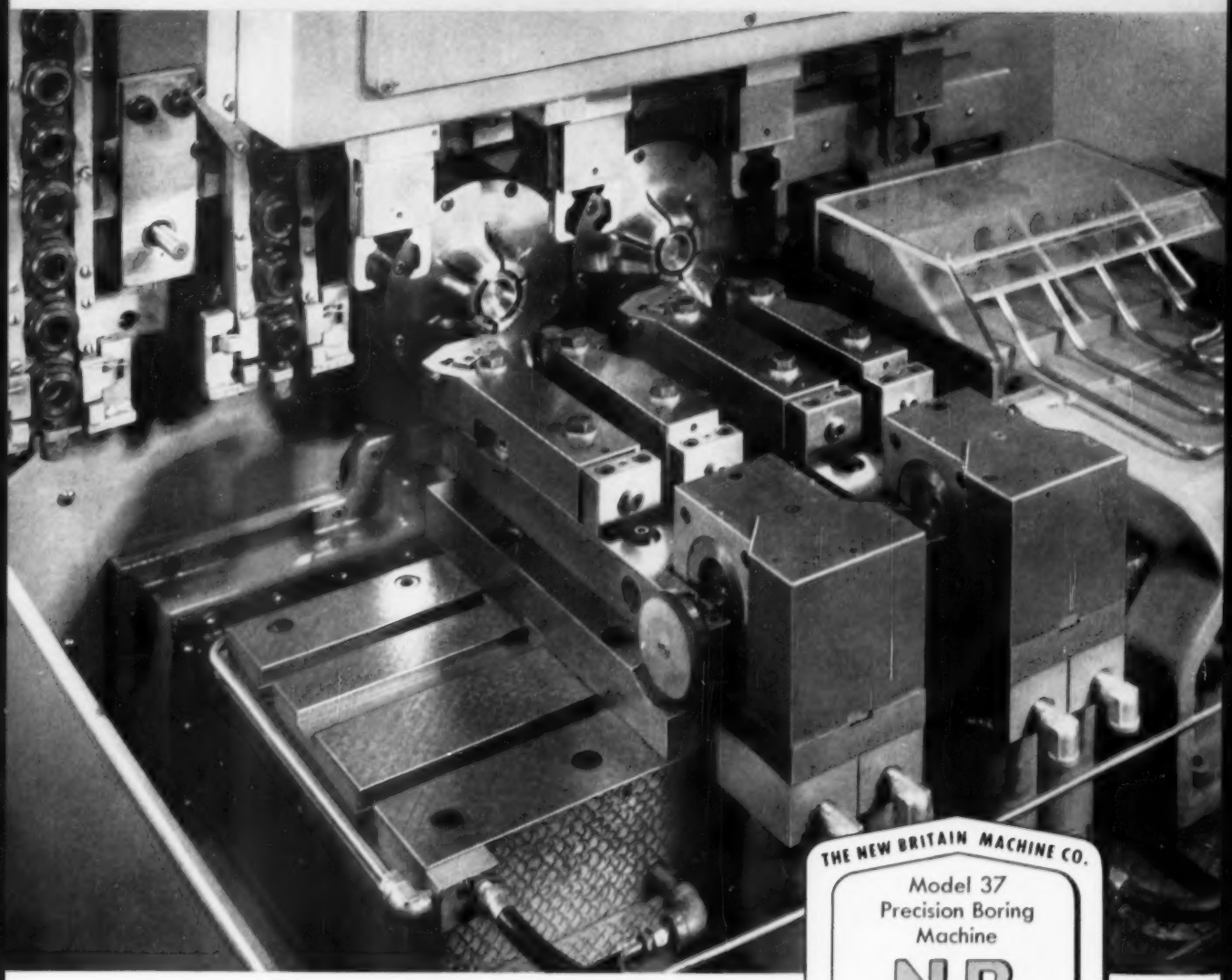
new New Britain chuckers handle bigger work pieces

If you know chucking machines you know the world-wide reputation of New Britains for accessibility, versatility, quick setup and sustained high production of precision parts.

Now new New Britain models enable you to apply this high productivity to pieces with chucking diameters up to ten inches on eight-spindle machines, twelve inches on six-spindle production and fifteen inches on four-spindle work.

Check this practical approach to more profitable production with your New Britain representative, or write for Bulletin 3R. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



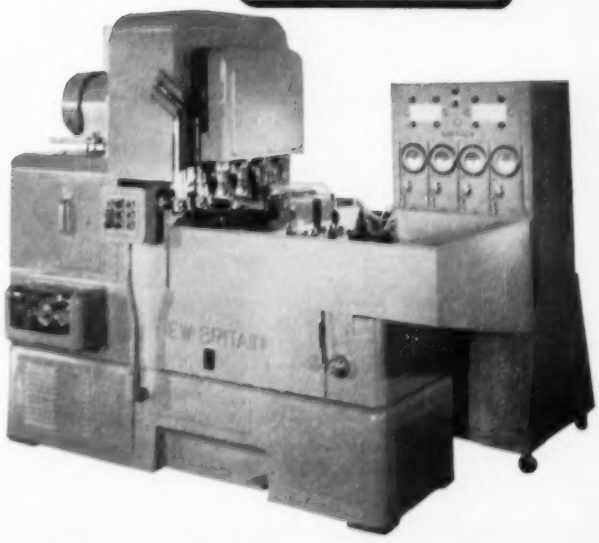


here's fully automatic precision turning and boring

This Model 37 New Britain is a down-to-earth money-making application of automated machining—made practical by automatic loading, *plus* high-spindle speeds, *plus* multiple-spindle production, *plus* automatic gauging, *plus* automatic close adjustment of each tool.

These modern machines, with or without automatic controls, will enable you to make simple work of tough jobs involving such operations as step turning, step boring, boring and facing, turning and facing, grooving, recessing, chamfering or generating contours.

Available in a complete line of horizontal, vertical and double-end models.



America's oldest, leading shear

the most in accuracy, speed

NIAGARA

POWER SQUARING SHEARS

builder offers you

and thrifty performance

One of the greatest values of a Niagara Power Squaring Shear is the unequaled experience of its builder. Niagara has been making shears for more than three quarters of a century.

Today, as in the past, the oldest leading name in shears stands also for the most modern in shear design. Niagara has continually set the pace in offering the most of **things which count the most** in dependable shear performance.

why YOU GET THE MOST IN ACCURACY:

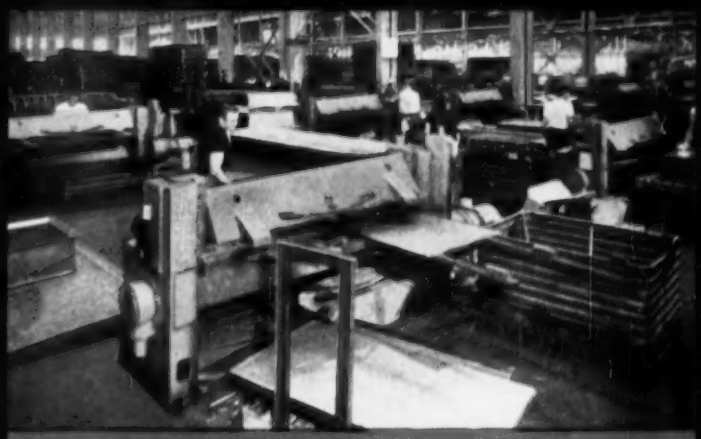
- With the cutting line fully visible, the positive power actuated, self-compensating holddown grips work securely. Multiple pressure feet on 6" centers apply uniform pressure, contacting the work with low impact to safeguard material and bed against damage. Long or short work is held tight against the bed. There's no rippling of the sheet as the keen edged, low-sloped upper knife shears through . . . clean and smooth.
- Niagara's fully closed box section construction of bed, crosshead, holddown and housings plus ample and accurately held crosshead guides resist horizontal, vertical and torsional stresses with minimum deflection.
- Edges are trimmed straight and true within micrometer tolerances. Blanks, too, are cut accurately to size and shape without making compensating allowances when setting gages. Only a Niagara Shear possesses **all** of the necessary features to insure maximum accuracy!

why YOU GET THE MOST IN SPEED:

- More working strokes delivered per minute and instant engagement of the Niagara Sleeve Clutch assure more cuts per hour. In continuous feed shearing, quick release of the power driven holddown enables a strip to be cut at each stroke.
- There's no need to adjust knife clearance every time a different thickness of stock is cut. Individual holddown feet are self-compensating. Two sheets of different thicknesses can be cut at the same time with the same knife adjustment and with the same accuracy.
- Ease of operation, quick setting gages and confidence inspired by safety features further increase hourly output . . . and make a Niagara Shear a truly productive, profitable investment for you!

why YOU GET THE MOST IN THRIFTY PERFORMANCE:

- Simplicity of design, involving a minimum number of parts, cuts out costly maintenance. With less to go wrong, there's less to repair and replace.
- Vital parts of Niagara's driving mechanism (clutch, gearing, flywheel, eccentrics and detent) operate in enclosed oil-tight cases. Ideal lubrication and maximum safety are thus insured.
- With power transmitted from the drive through efficient spur gears and Niagara's instant engaging, multiple-point sleeve clutch, there are no sliding surfaces (such as in worm gears and friction clutches) to consume power, generate heat and wear rapidly.
- Niagara 4-cutting-edge knives, manufactured entirely within the Niagara plant, are uniformly tough to withstand hard usage and are promptly available.



Niagara Shears at work in Ohio plant of one of the major electrical appliance manufacturers.

MOST EXACTLY SUITED TO YOUR NEEDS, TOO!

To fit your requirements exactly, consult a Niagara representative. With over 7 dozen models available in capacities from shim stock to 1" mild steel and in cutting lengths from 3 to 24 ft., he'll be able to recommend the shear that's **right** for you.

ILLUSTRATED, FACT-FILLED BULLETIN 69 MAILED FREE ON REQUEST

It will give you detailed information on the complete, modern line of Niagara Underdrive Squaring Shears. Write for your copy today.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N.Y.

DISTRICT OFFICES

BUFFALO • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA

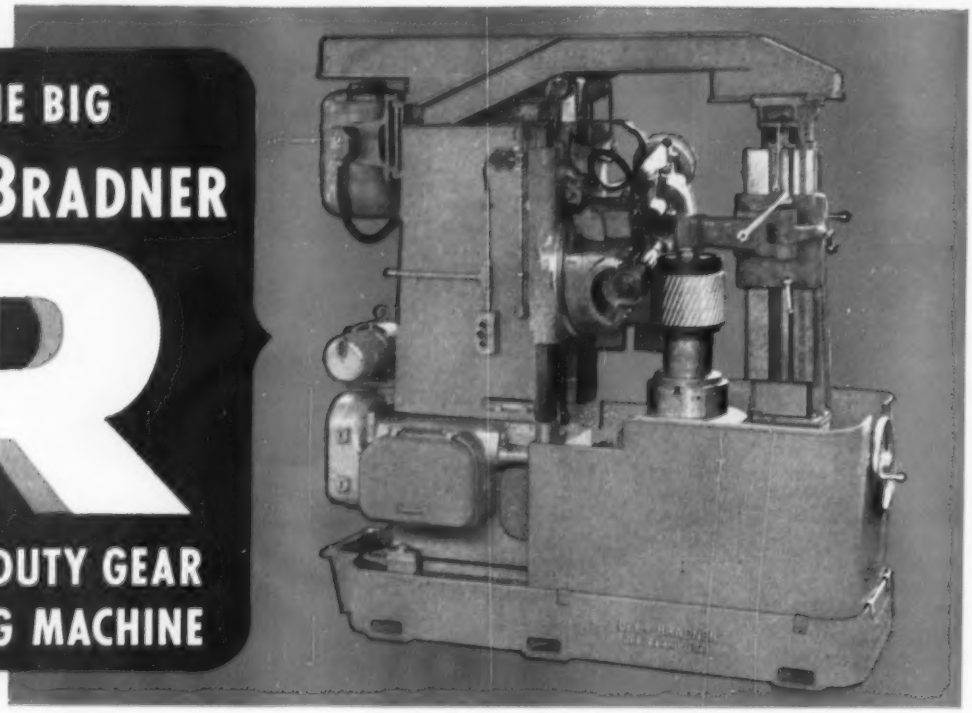
Dealers in principal U. S. cities and major foreign countries

America's Most Complete Line of Presses, Shears, Press Brakes, Other Machines and Tools for Plate and Sheet Metal Work.

Extra Rugged...

For The ROUGH Hobbing Jobs!

THE BIG
LEES-BRADNER
R
HEAVY-DUTY GEAR
HOBBING MACHINE



Built rugged and reliable to handle those rough, tough gear hobbing jobs . . . that's the new Lees-Bradner Model "R".

It's designed to hob spur or helical gears up to 1¼ DP with a left or right hand maximum helix of 45°.

The Model "R" features fast loading and unloading, ready access to index and feed change plus easy operation and maintenance.

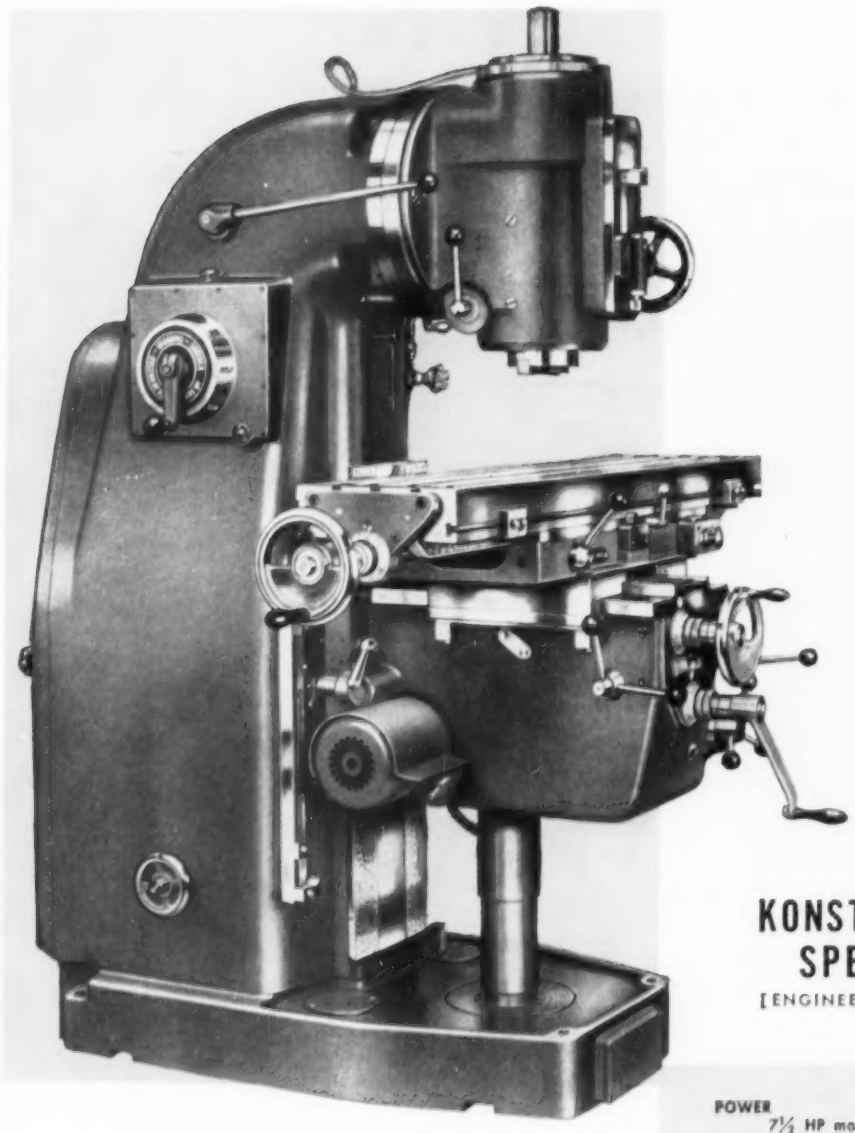
Write for your free brochure giving the detailed capacities and specifications of this new heavy-weight hobbing machine.

SPECIFICATIONS

Maximum outside diameter with tailstock column	16"
without tailstock column	18"
Minimum C/D hob to work	1½"
Maximum C/D hob to work	12"
Travel	18"
Maximum diameter of hob (3-1, 6-1, or 12-1 backgearing)	10" x 10"
DP range	1¼ DP to 16 DP
Maximum manual (or electric) shift of hob	6"
Diameter of hole through work spindle	2"
Machine weight	13,000 lbs.

the **LEES-BRADNER** *Company*

CLEVELAND 11, OHIO • U.S.A.



KONSTRUERAD FÖR SPECIALISTER

[ENGINEERED FOR SPECIALISTS]

SAJO'S NEW No. 2 VERTICAL MILLER MODEL VF-54

Built to U.S. Standards by Swedish craftsmen, this precision Miller meets exacting requirements at a modest price.

SAJO Model VF-54 is an ALL GEARED Vertical Miller with hand-scraped sliding surfaces, SKF "SP" anti-friction bearings on spindle and gear shafts, hardened chrome nickel gears, ground integral splines on gear shafts, externally adjustable back-lash eliminator for table feed screws, dial-selected feeds and speeds.

POWER

7½ HP motor for spindle (5 HP optional). 1½ HP motor for table feed and 3 direction rapid traverse.

RANGE

16 spindle speeds 39-1500 RPM (31-1200 optional), No. 50NMT spindle, 12 table feeds 1¼ to 25 inches/min. longitudinal and cross, ½ to 12½ inches/min. vertical. Power rapid traverse, all directions. Table travel 33⅓" long., 10" cross, 18" vertical.

CONTROLS

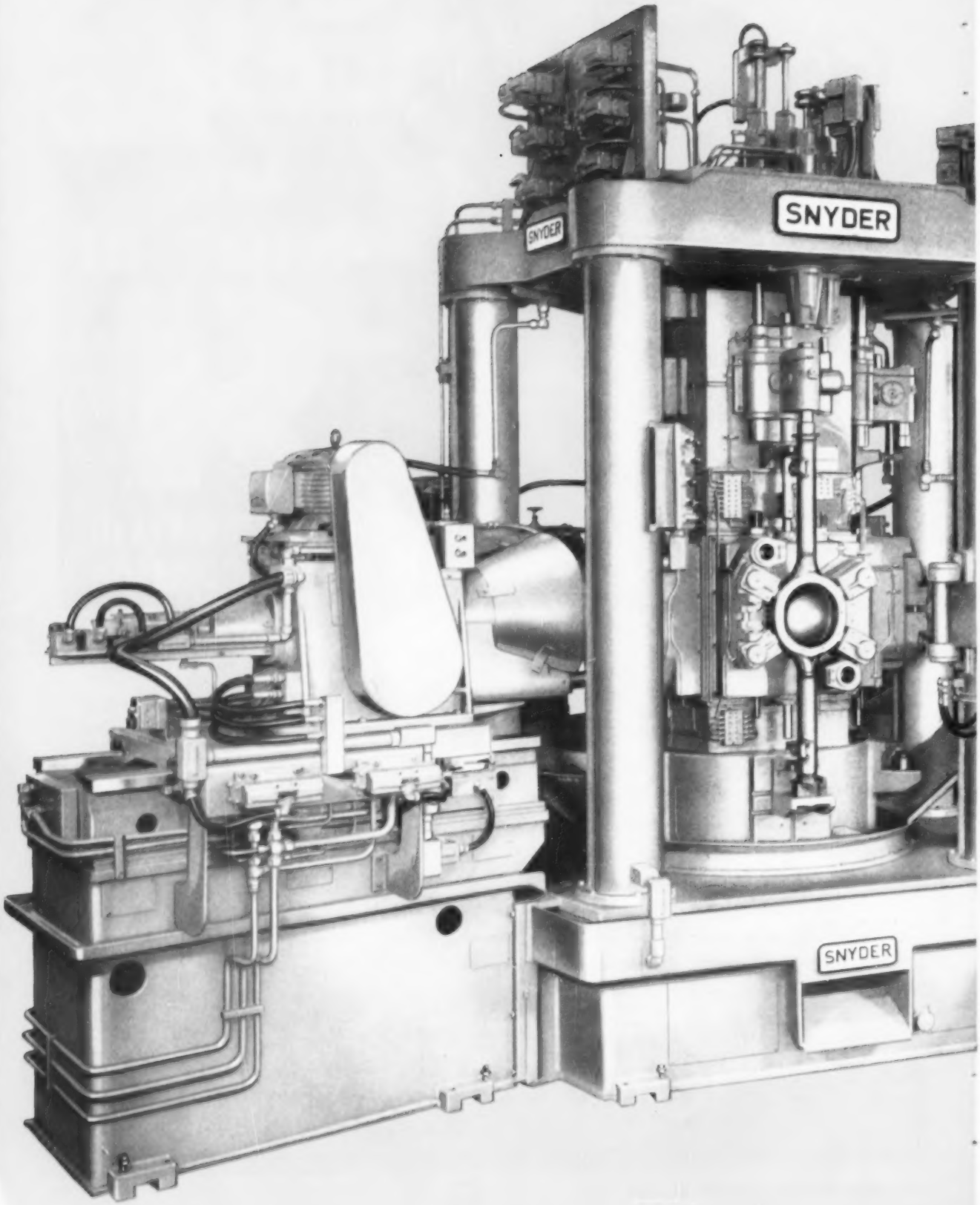
Single adjustable START-STOP-BRAKE lever. Dial selection of speeds and feeds (U.S. inch calibrated) with single lever controls. Magnetic motor starter.

FOR INFORMATION, CATALOGS, AND REFERENCE DATA, WRITE

austin INDUSTRIAL CORPORATION

76F MAMARONECK AVENUE • WHITE PLAINS, NEW YORK

DEALERS IN PRINCIPAL CITIES • LOOK FOR THE AUSTIN SEAL . . . YOUR FULL GUARANTEE OF SATISFACTION


SNYDER
SNYDER
SNYDER

SNYDER VERTICAL TRUNNION MACHINE

for processing rear axle housing assembly; rough and finish faces banjo face, combination drills and reams ten holes in banjo face and chamfers both sides of holes. Production: 105 pieces an hour at 100% efficiency.

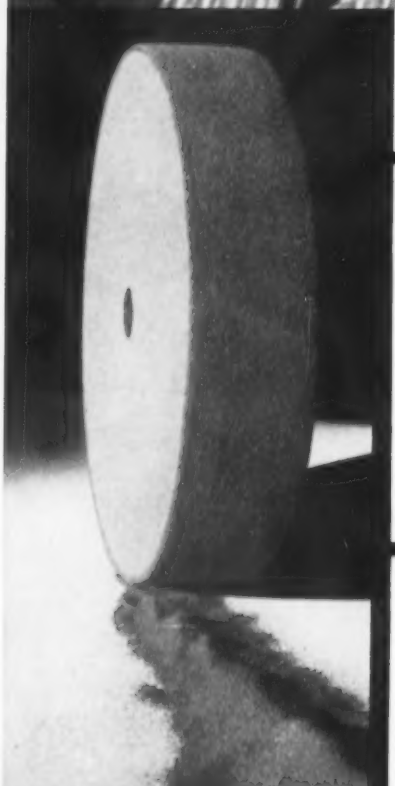
SNYDER

TOOL & ENGINEERING COMPANY

3400 E. LAFAYETTE • DETROIT 7, MICHIGAN

31 Years of Special Machine Tools with Automation

You polish with the "Touch of Gold" when your wheels or belts are coated with ALUNDUM B abrasive. This extremely hard, sharp grain cuts fast, clean and cool. And the Norton special high capillarity treatment means easier wetting with cement or glue — for maximum adhesion, longer wheel life and better polishing performance.



Norton ALUNDUM B abrasive consists of grains of uniform blocky shape. No flats, slivers or undersize grains to loaf on the job. No oversize grains to mar surfaces. Made in all grit sizes, from 20 through 240, to cover the widest range of polishing operations

More, and better, polishing with every set-up

ALUNDUM B abrasive brings the cost-cutting, value-adding "TOUCH OF GOLD"*

Ask Your Norton Distributor for the booklet "Setting Up Metal Polishing Wheels and Belts." Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., div. of Norton Company. *Export* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

G-310

NORTON

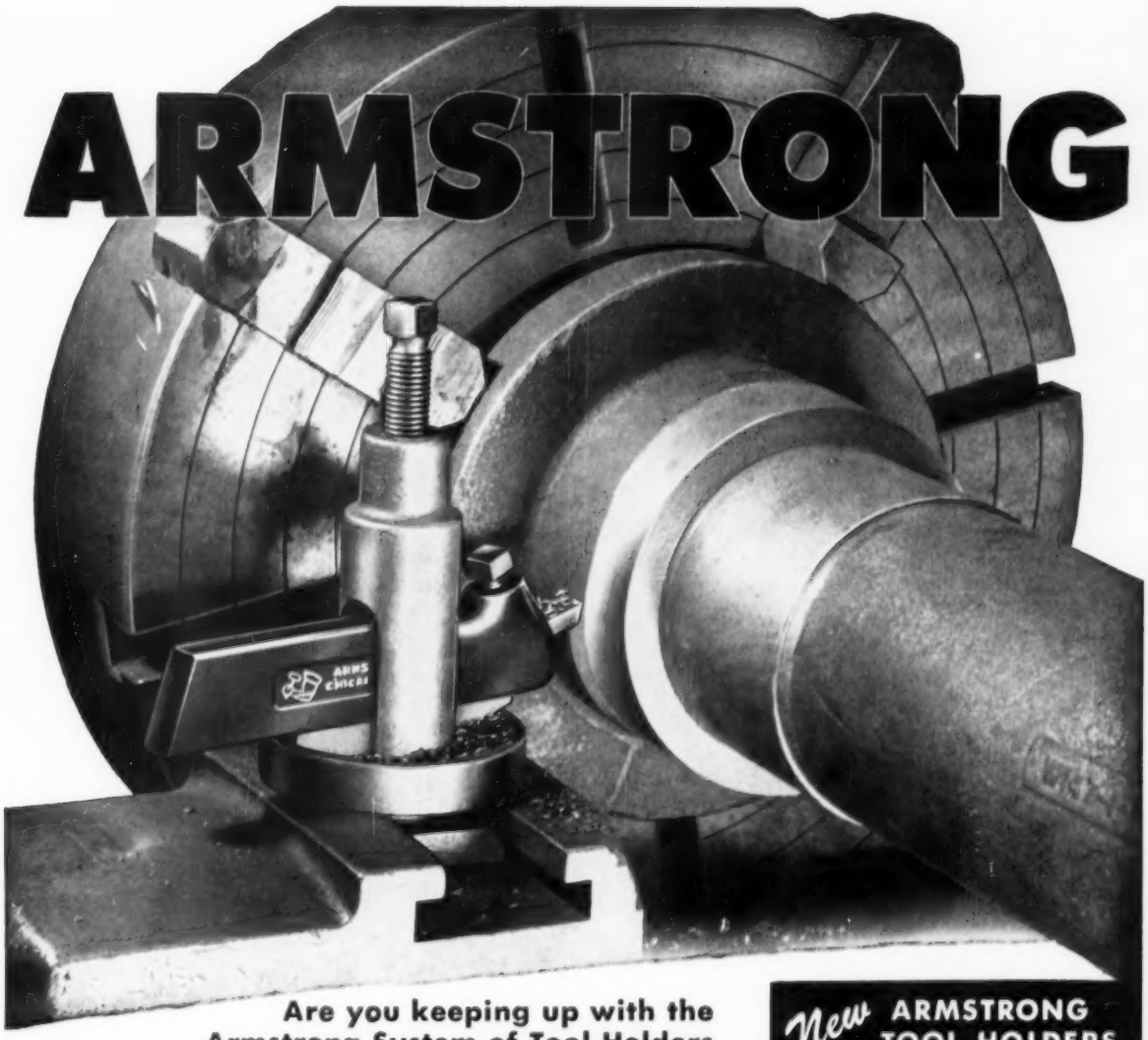
ABRASIVES

Making better products.. to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR MANNING PRODUCTS. Coated Abrasives • Sharpening Stones Behr-cat Tapes

ARMSTRONG



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

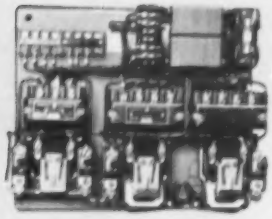
WRITE FOR CATALOG

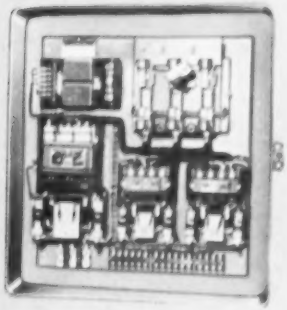
New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast-Alloy) Cutter-Bits

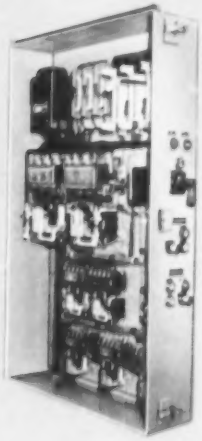
ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* 5215 W. ARMSTRONG AVENUE CHICAGO 30 ILL.

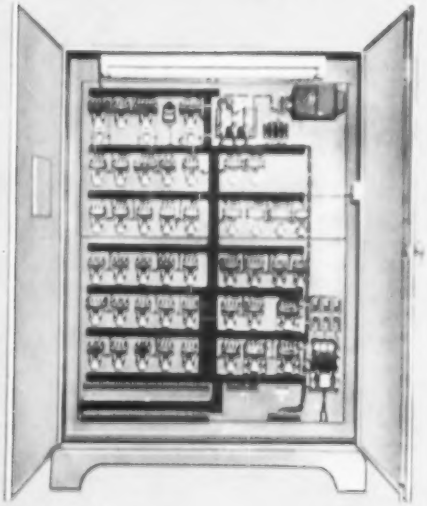
G-E general purpose control on

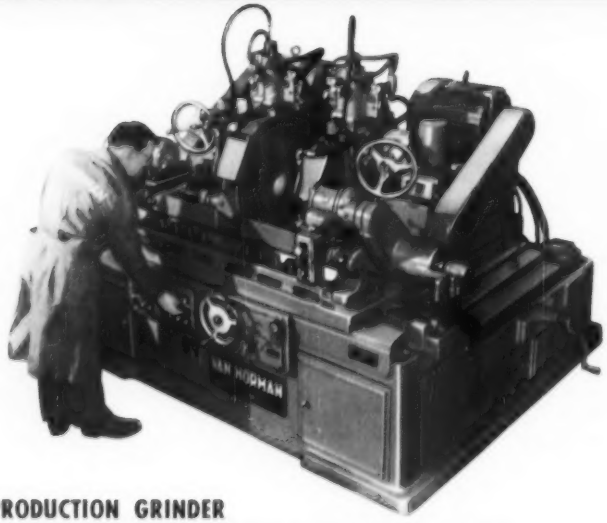
TYPICAL PANELS











NEW HIGH PRODUCTION GRINDER EQUIPPED WITH G-E CONTROL HOLDS 15 MICROINCH FINISH

This new Van Norman Bowgage Production Grinder is designed for high production grinding of any part that can be readily chucked. The grinder can remove 0.022-inch on a 1⅝-inch diameter piece, hold a 15 microinch finish, and with operator initiated automatic clamping can have a new piece ready for grinding every 15 seconds.

Manufactured by the Van Norman Machine Co., Springfield, Mass., the Bowgage Production Grinder provides the equivalent of two Single Head Production Grinders on a single base. This reduces the floor space required, operator fatigue, handling time, and maintenance.

machines for industry

NEW G-E PAN-A-TROL* PANELS

A new program for packaged machine control from General Electric

Pan-A-trol panels are the focal point of a new program from General Electric for packaged machine control. This program, which places a new emphasis on panels for the dynamic automation age, features outstanding service to customers. The Pan-A-trol name distinguishes these panels which are applied to machines with a maximum rating of 200 horsepower, 600 volts, a-c.

This new program emphasizes the General Electric services available to you with Pan-A-trol packaged control. An enlarged engineering staff is ready to work with you on developing a circuit and panel design to meet your machine requirements. These G-E engineers can also help you take advantage of cost reductions due to repetitive or quantity Pan-A-trol orders.

Faster and better factory service is provided by expanded manufacturing facilities. Up-to-date equipment and skilled employees assure you of fast, prompt shipment. And, of course, General Electric's field service organizations assure your customers of fast local service if desired.

PAN-A-TROL NAMEPLATE identifies each panel. Built from your specifications, these panels offer you the installation, maintenance, and reduced stocking benefits of packaged control.

See your G-E Apparatus Salesman about this new program, and let him tell you how you can benefit from Pan-A-trol packaged control. **And, write Section 731-3 for bulletin GEA-6334.** General Purpose Control Department, General Electric Company, Bloomington, Illinois.

*Reg. trade-name of General Electric Co.

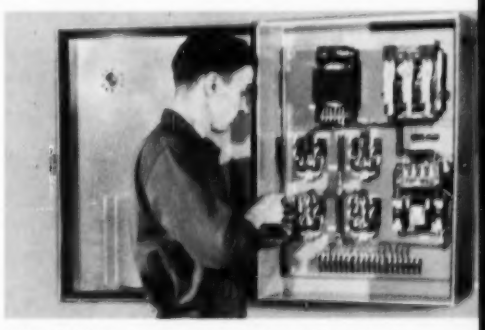
Progress Is Our Most Important Product

GENERAL ELECTRIC

4 WAYS TO BENEFIT WITH PAN-A-TROL PANELS

ENGINEERING ASSISTANCE. An enlarged staff of General Electric engineers in the factory and local offices are ready to help you with Pan-A-trol panels for specific applications.

MANUFACTURING FACILITIES. Skilled employees in new, enlarged factory facilities with the latest manufacturing methods assure fast, prompt shipment for Pan-A-trol control panels.



UNIT DESIGN. Pan-A-trol packaged control combines circuit design, device selection and arrangement into one coordinated unit. Only connections to rest of machine need be made.

PAN-A-TROL QUALITY. High-quality components and construction, backed by General Electric's field services, assure long dependable performance with Pan-A-trol packaged control.

SPRING STEEL RING

9" O.D. x 6¼" I.D. x .091" 50 pieces (100 surfaces) per hr.; .004" stock per side; limits ±.0005"

CAST IRON END PLATES

30 pieces (60 surfaces) per hour; ⅛" stock removed each side; limits ± .002"

ADJUSTING SCREW WASHERS

Low carbon steel; 200 pieces (200 surfaces) per hour; .025" stock removed; limits ± .001"

HOT ROLLED STEEL CAMS

225 pieces (450 surfaces) per hour; 3/32" stock removed each side; limits ± .001"

NOW! BLANCHARD PRESENTS ANOTHER GREAT NEW GRINDER

with Automatic Cycle Control

This great new Blanchard Surface Grinder performs a variety of jobs with speed, ease and accuracy.

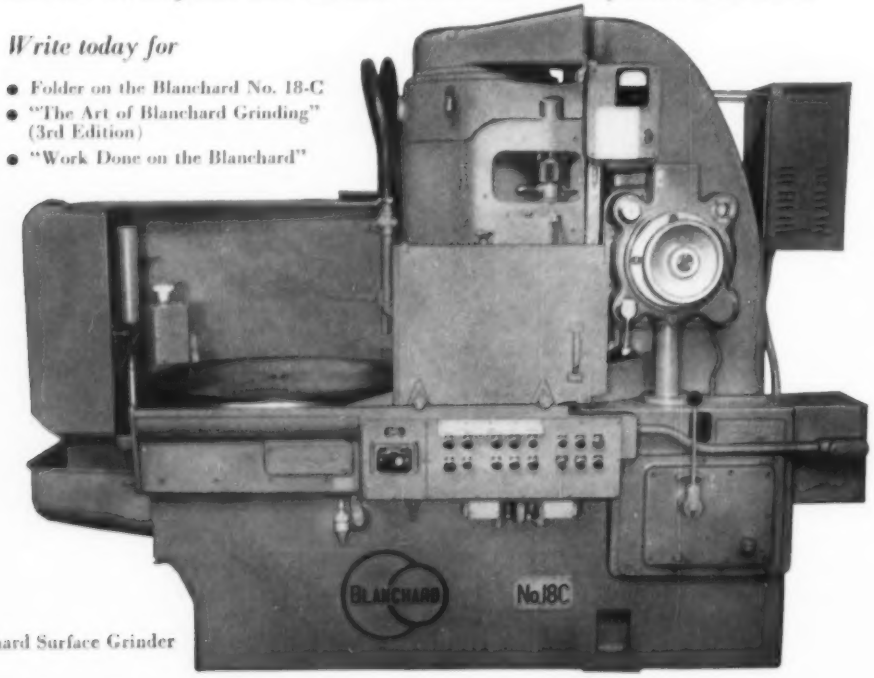
One operator can easily operate two of these No. 18-C grinders under balanced conditions. By using the automatic cycle, he can unload, clean and reload one grinder while the other is grinding.

Here's what the automatic cycle does: moves chuck (30" or 36" dia.) to grinding position and starts it rotating; starts wheel rotation and coolant pump; provides rapid wheel approach to work; engages power down-feed at preset rate; changes to fine feed just before finished size is reached; stops feed when work is to size – "sparks" out; raises wheel head; stops wheel, coolant pump and chuck; moves chuck to loading position – demagnetizes chuck.

This new Blanchard also features: push button selection of manual or cycle operation; size control; simplified feed and head traverse controls; adjustable dwell timer.

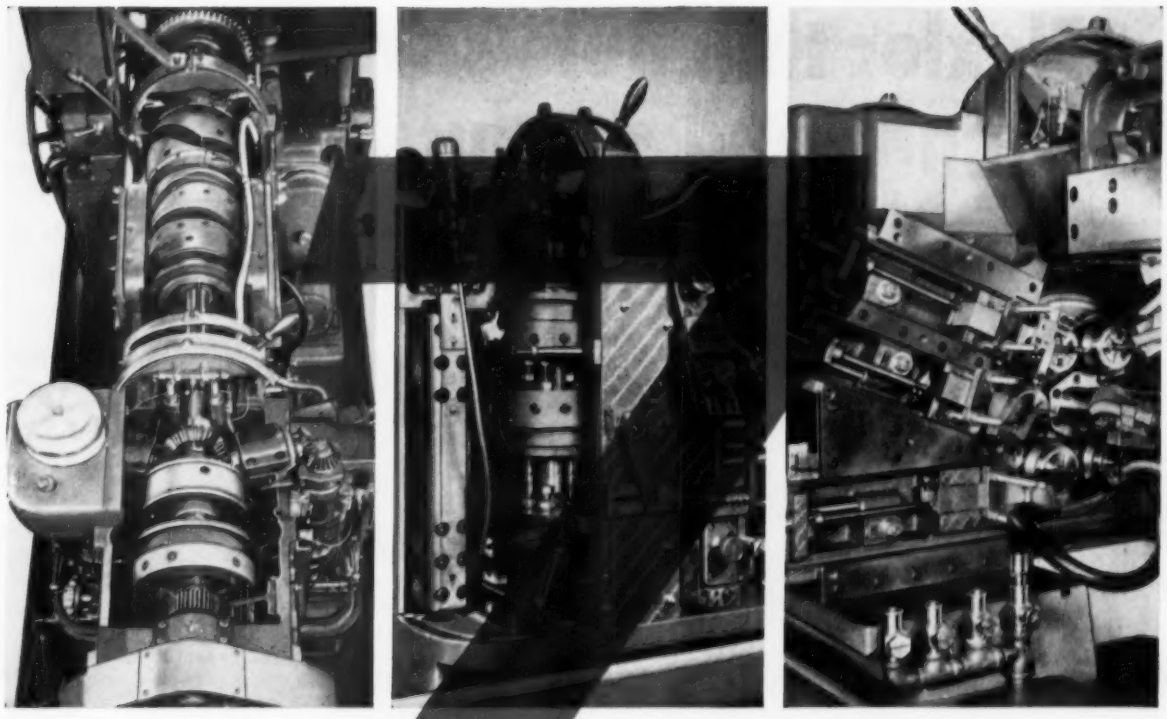
Write today for

- Folder on the Blanchard No. 18-C
- "The Art of Blanchard Grinding" (3rd Edition)
- "Work Done on the Blanchard"



No. 18-C Blanchard Surface Grinder

THE BLANCHARD MACHINE COMPANY 64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

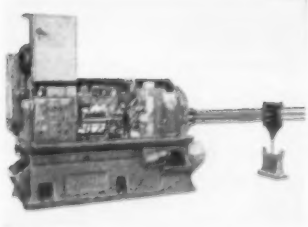


Seven Fast Changeover Models

With the prospects of improved tool materials ever decreasing the actual machining time of work on Multiple Spindle Automatics, long runs tend to become short runs. Facility that decreases the time for job changes becomes more important to low-cost production.

Conomatics are available in as many as seven fast changeover models. These are the 9/16", 1", 1⅝" Sixes, and the 2⅝", 3½", 5", and 5¼" Fours.

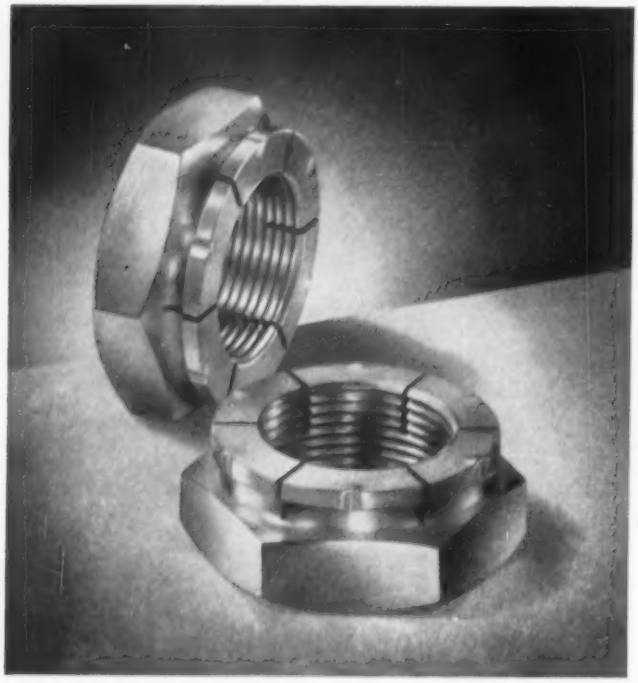
These models are equipped with dial adjustment of working stroke of all slides, without making necessary change of total stroke or positive stop settings. Write, wire, or phone for literature descriptive of these features and other facilities available to users, or prospective users.



Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.

Flexloc thin nuts save space, weight and production time



Self-locking nuts are 30% lower and lighter; speed up assembly with hand or power tools

Self-locking FLEXLOC thin nuts are 30% lower than regular height locknuts of the same nominal diameter. They fit into spaces where regular height locknuts will not go. You can design lighter, more compact units with them.

Where you must reduce weight in a completed assembly, you can save by using shorter bolts with these lighter nuts. And you save production time. The length of engagement of mating threads is shorter: fewer revolutions of hand wrenches or power nut runners are needed to seat them.

FLEXLOC nuts are of 1-piece, all-metal construction. You can use a FLEXLOC fully seated as a locknut or at any point along a bolt as a stop nut. Once the threads in the resilient locking section are fully engaged, the FLEXLOC grips the mating threads with uniform locking torque wherever wrenching stops. Since there are no nonmetallic inserts to come out or deteriorate, the locking life of a FLEXLOC is virtually unlimited.

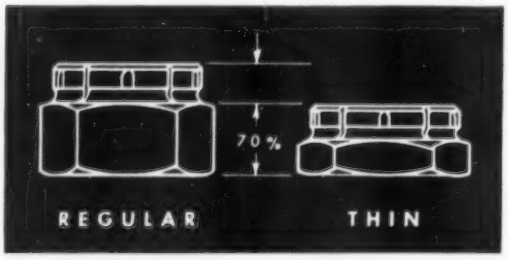
Your authorized industrial distributor stocks FLEXLOC nuts in a variety of sizes, materials and finishes. Consult him for details. Or write us for information about your special locknut problem. Flexloc Locknut Division, STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.

SPECIFICATIONS
FLEXLOC THIN NUTS

NATIONAL COARSE THREAD—U.S.S

SIZE	A INCHES	H INCHES	WIDTH ACROSS CORNERS	WEIGHT PER 1000 NUTS
6-32	.312	.125	.361	1.8
8-32	.344	.172	.397	2.8
10-24	.375	.172	.433	3.3
¼-20	.438	.203	.505	5.4
5/16-18	.563	.250	.649	11.6
⅜-16	.625	.265	.722	14.9
7/16-14	.750	.312	.866	24.9
½-13	.813	.312	.938	28.4
9/16-12	.875	.359	1.010	36.1
⅝-11	1.000	.391	1.155	54.1
¾-10	1.125	.406	1.299	69.2
⅞-9	1.312	.469	1.516	107.5
1-8	1.500	.563	1.732	171.6
NATIONAL FINE THREAD—S.A.E.				
6-40	.312	.125	.361	1.8
8-36	.344	.172	.397	2.8
10-32	.375	.172	.433	3.3
¼-28	.438	.203	.505	5.4
5/16-24	.500	.250	.577	8.7
⅜-24	.563	.266	.649	11.5
7/16-20	.625	.312	.722	14.9
½-20	.750	.312	.866	21.7
9/16-18	.875	.359	1.010	36.2
⅝-18	.938	.391	1.082	42.4
¾-16	1.063	.406	1.227	54.5
⅞-14	1.250	.469	1.443	84.6
1-14	1.438	.563	1.660	136.3
1 1/16-12*	1.625	.625	1.876	193.5
1 1/4-12*	1.813	.750	2.093	296.0
1 3/8-12*	2.000	.812	2.309	389.0
1 1/2-12*	2.187	.875	2.526	498.0

*Steel only (plain or cadmium plated) in stock sizes.



FLEXLOC thin nuts are 30% lower than regular height locknuts. There is a corresponding saving in weight. In sizes through 5/16 in., thin FLEXLOCS meet tensile strength requirements for regular height locknuts. FLEXLOC nuts can be made in the thin type because every thread, even those in the locking section, carries its full share of the load. There are no nonmetallic inserts to waste head space or weaken the structure of the nut.

Standard FLEXLOC self-locking thin nuts are available in plain or cadmium plated alloy steel, for use in temperatures to 550°F; in plain or silver plated corrosion resisting steel, for temperatures to 750°F; and in brass and aluminum, for temperatures to 250°F.

STANDARD PRESSED STEEL CO.

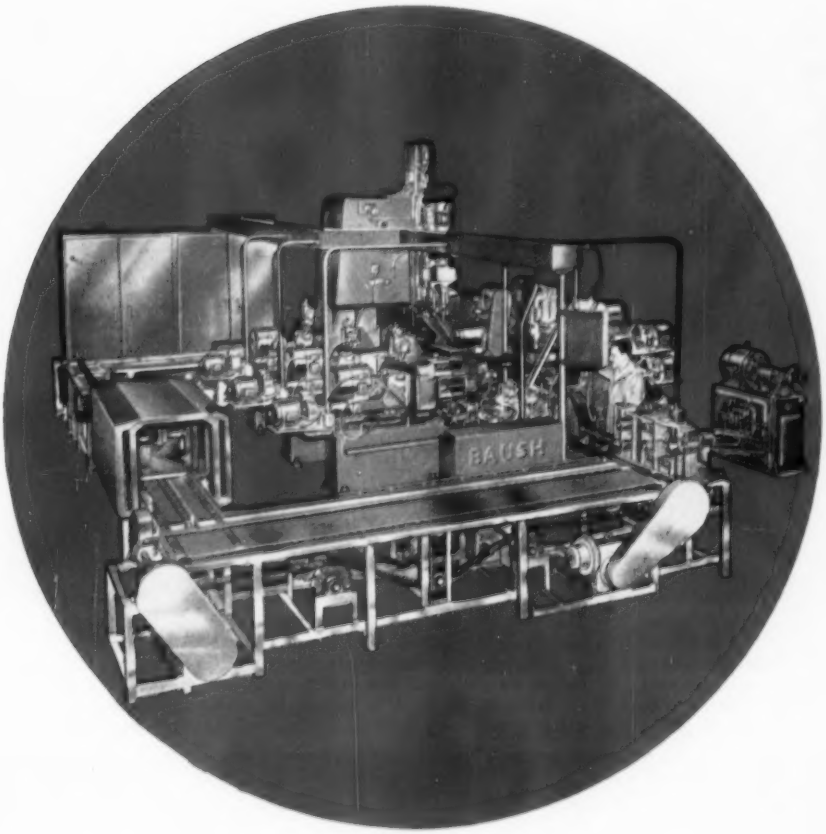
FLEXLOC LOCKNUT DIVISION SPS

JENKINTOWN PENNSYLVANIA

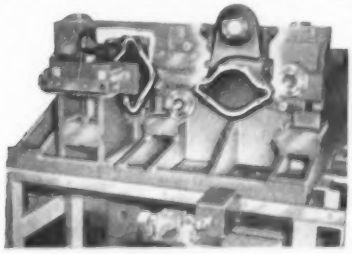
Your Production can be Increased with

BAUSH AUTOMATIC

Multi-Spindle Machine Tools



The Transfer is made up with — 5 Horizontal Model "S" mechanical leadscrew units, one of which is arranged with swivel to raise milling cutter from work • 1 Vertical Model "S" mechanical leadscrew unit • 2 Horizontal hydraulic units • 8 Fixed center heads with a total of 39 spindles • Single bar transfer mechanism • 5 Holding pallets with part held in 2 positions • Pallet conveyor • Electrical controls to J.I.C. Standards • 18 Motors



Automatic machines similar to the one illustrated more than pay for themselves through increased production at lower cost and with far less "down time" resulting from change overs, maintenance, etc.

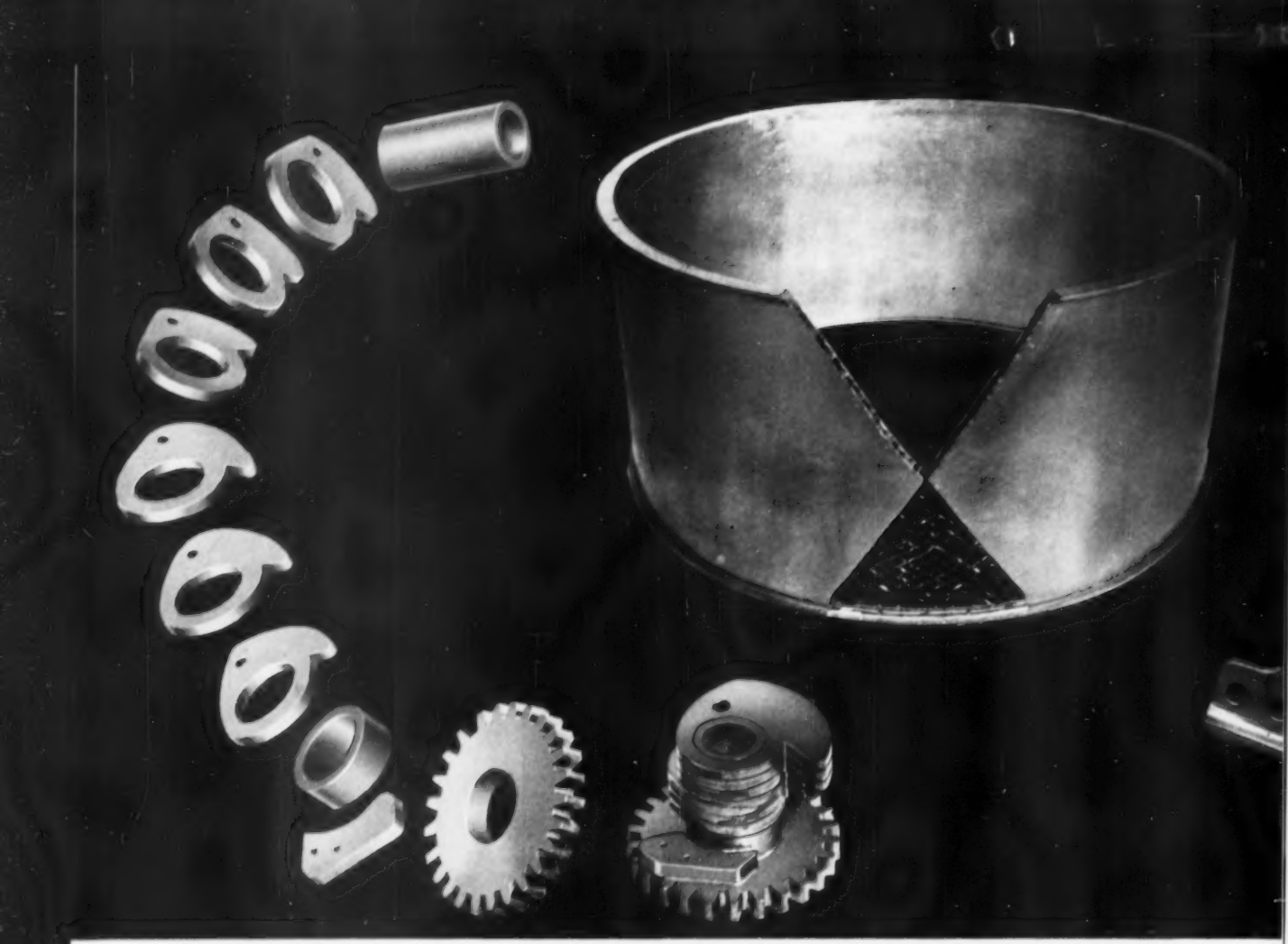
Baush designed and built this 8-position, 4 station Transfer to drill, counterbore, countersink, chamfer, rough and finish bore, ream, face and turn 60 Chain Case Covers per hour at 100% efficiency for a leading engine manufacturer.

Why not let us show you how to adapt automatic tools and automation to increase *your* plant production.
There is no obligation in talking it over.

Write, wire or 'phone us — we'll gladly discuss your problems.

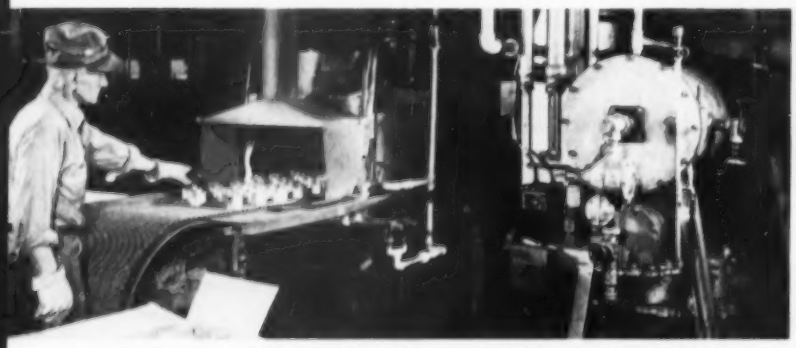
BAUSH machine tool co.
SPRINGFIELD 7, MASS.

B
BAUSH

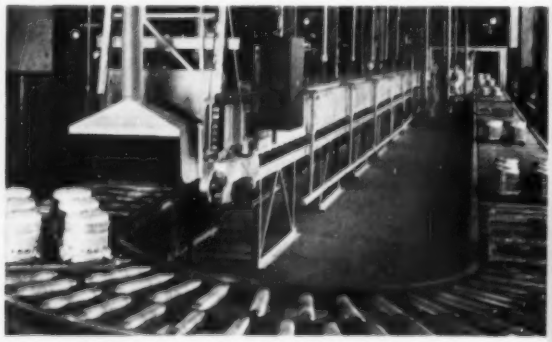


Versatility of furnace brazing is shown in these applications. Complex assemblies like the cam-and-gear cluster on the left can be fabricated from punched laminations brazed securely in a General Electric mesh-belt furnace. Required contours are obtained without expensive machining from solid stock.

Thin sections can be joined to heavy sections to produce light-weight rigid structures without sacrificing strength or inducing local distortion. Honeycomb structure at top center weighs about one fourth as much as solid assembly of same rigidity. It is typical of design improvements made possible by brazing in General Electric furnaces.



Continuous production of small parts in this General Electric mesh-belt furnace is carried out by loading assemblies directly on the belt. Protective atmosphere equipment, at right, eliminates need for flux in most cases, keeps parts clean enough to be passed directly from the furnace, without cleaning or pickling.



Automatic charging, and discharging and return conveyors of this General Electric roller-hearth furnace make it almost self-operating, reduces handling costs. G-E roller-hearth furnaces handle heavy assemblies and are well suited for automated lines.

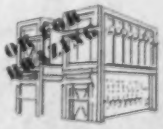
GENERAL ELECTRIC SELLS A COMPLETE LINE OF HEAT PROCESSING EQUIPMENT

FURNACES • METAL-SHEATH • INDUCTION

Box

Cylindrical Pit

Roller Hearth



Elevator

Produce Complex Assemblies Faster and at Less Cost with General Electric Furnace Brazing

Two or more metals can be joined, as in the bellows housing shown above. The steel flange is furnace-brazed to a brass shell, using preplaced rings of silver brazing alloy. The desirable qualities of each metal are retained.

Development work is done in this General Electric box furnace, which could also be used for job-lot production. Low in first cost, General Electric box furnaces need little maintenance.

General Electric furnace brazing speeds production of really "tough" assemblies—and often does it at less cost than you can do it by your present methods.

For example, here are three types of work where you can improve production with furnace brazing.

You can make complex assemblies from already formed components, and save both material and machine costs.

You can make assemblies of two or more different alloys without changing the desirable characteristics of either.

You can join thin sections to heavy sections without sacrificing strength or inducing local distortion.

These characteristics of furnace brazing can be used in a number of widely different production setups. And General Electric's complete line of furnaces and associated equipment lets you pick the proper furnace to introduce furnace brazing into your particular setup—economically, efficiently.

Cost reductions are typical with furnace brazing because labor content per assembly goes down while output goes up. Waste is reduced since assemblies can be built up of components instead of being machined from solid stock. Uniformity of results frequently leads to reduced inspection costs.

Improved products are the rule with furnace brazing. Life of assemblies is increased because joints have high strength, resist vibration and impact, and are uniformly tight. Assemblies show little or no distortion, since they are free from localized strains. They present a good finished appearance without afterwork because the brazing alloy forms neat fillets. Also protective furnace atmospheres eliminate formation of oxides and do away with the need for flux in most cases.

Increased production over other joining methods is possible, since many joints can be brazed simultaneously. Furnace brazing is adaptable to continuous production, with increasing output.

For a careful analysis of your furnace brazing needs call your General Electric Heating Specialist. Ask him to show you how you can benefit by using furnace brazing. You can reach him at your local General Electric Apparatus Sales Office. If you prefer, send in coupon below for bulletins describing furnace brazing operations and equipment.

GENERAL ELECTRIC

FREE PROCESS BULLETINS

Section B721-8,
General Electric Company
Schenectady 5, New York

Please send me free bulletins checked below.

MODERN HEAT PROCESSING BULLETINS

- ☐ Furnace and Induction Brazing, GEA-5889
- ☐ Protective Atmospheres, GEA-5907

TECHNICAL BULLETINS

- ☐ How and Where to Use Furnace Brazing, GEA-3193
- ☐ Electric Furnace Brazing, GER-106
- ☐ Furnace Brazing of Machine Parts, GER-339

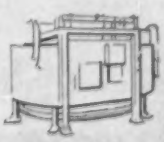
NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

Mesh Belt



Rotary Hearth

Tower

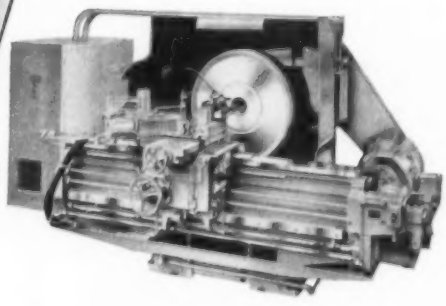
Cylindrical Bell

Metal-sheath

Electronic Induction

There's only one T lathe

. . . designed and perfected by Lodge & Shipley for ANY large diameter, short length work



There are 8 types of T Lathes to fit every production requirement in various combinations of:

. . . straight and angular facing, turning and boring, and

. . . contour facing on both sides of center, contour turning and boring.

As the use of Lodge & Shipley T Lathes spreads over an ever-widening variety of applications, the extreme versatility of this lathe becomes more apparent. Wherever large diameter, short length workpieces must be faced, turned or bored, the T Lathe proves notable accuracy and productivity.

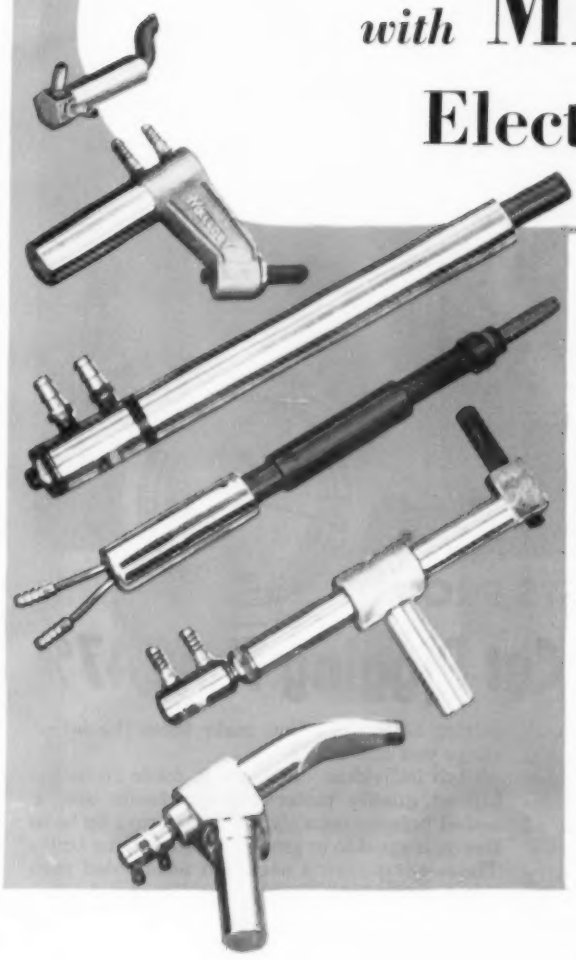
Evaluate your own work of this nature, work that may now be machined on oversize lathes, boring mills or other makeshift set-ups. Transfer to a T Lathe for faster, lower cost production and release the other machines to more suitable uses.

T Lathes are far faster, more sensitive and much more accessible. They take less floor space and cost less than comparable machines. Get the facts . . . write for Bulletin 215. ***The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.***

Lodge & Shipley

. . . . your **LODGE**-*ical choice!*

Special Set-Ups Made Easy...
with MALLORY
Electrode Holders



BEFORE you go to the time and expense of getting a custom-made holder for a welding job, take a look at the variety of standard Mallory Electrode Holders. You can probably pick out the design your application requires . . . at substantial savings in cost and delivery.

The most complete line in the industry, Mallory Electrode Holders offer many varied designs . . . straight, offset, paddle type, swivel head, low inertia, universal and close-coupled. Light, standard and heavy-duty models are available for pressure ranges from under 100 lbs. to more than 6000 lbs.

By using these versatile holders in combination with the hundreds of different types of Mallory welding electrodes, you can assemble an almost unlimited variety of welding set-ups. Most welds in channels, or other hard-to-reach locations can be made with standard Mallory welding parts. And when your application poses problems outside of the range of standard models, Mallory engineers are well qualified to design special holders and electrodes for your individual needs.

Look through the Mallory Resistance Welding Catalog and pick out a series of holders that will equip your shop for the range of work you are doing. Your nearby Mallory distributor will be glad to give you a copy of this useful catalog and to help in your selection . . . or you can get one by writing direct to Mallory.

Expect more...
Get more from

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario

STOCK ELECTRODES

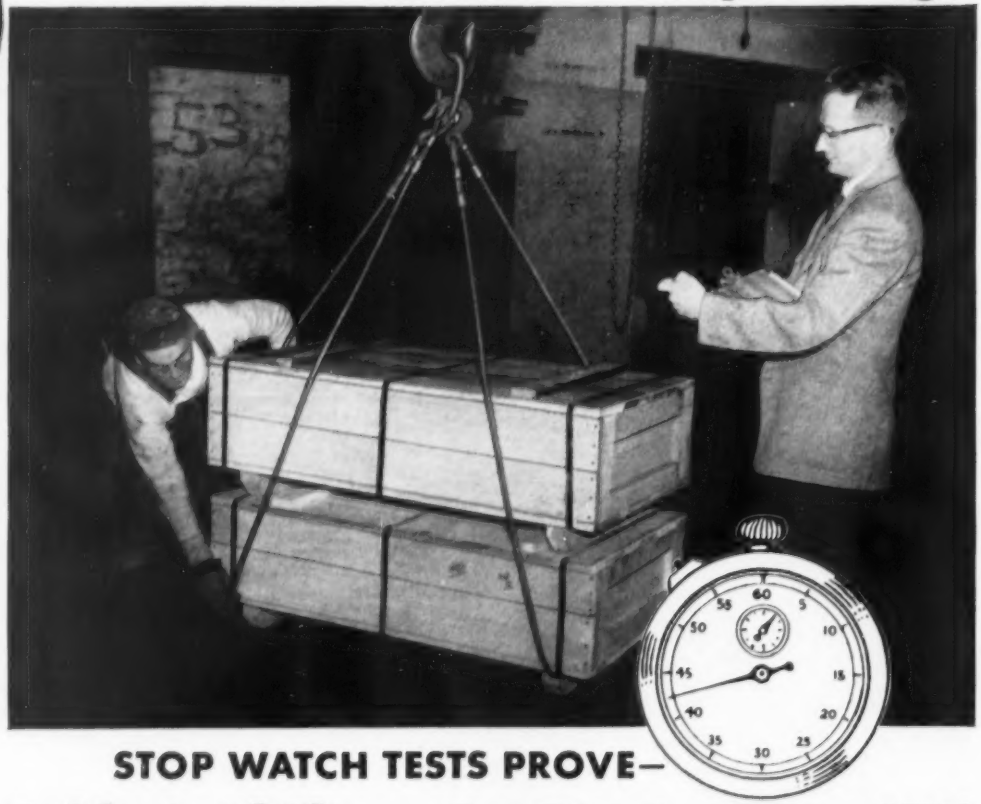
Hundreds of shapes and sizes are available in stock . . . with round water holes or the exclusive Mallory fluted cooling hole for longer life between dressings. Save you both in cost and delivery time.

STANDARD ELECTRODES

Odd-shaped electrodes you consider "specials" may well be standard items for Mallory . . . can be made quickly with existing tools, in a wide range of single-bend, double-bend and irregular shapes.

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

ACCO Registered* Wire Rope Slings



STOP WATCH TESTS PROVE—

Cable-Laid Slings Cut Rigging Time 47%

• An eastern manufacturer ran time and motion studies on handling the two heavily loaded crates shown above. He found that his riggers could cut their time 47% when Cable-Laid Slings were used, instead of slings of standard construction.

For Cable-Laid Slings combine the flexibility of manila rope with the strength of steel. To this flexibility they add extreme resistance to kinking, and freedom from crankiness. As a result they are easy to handle—cut operating time. And they keep their ease of handling long after slings of standard construction are kinked and snarled to the point of uselessness.

This performance is possible only because of the combination of a special wire rope construction with ACCO's patented DUALOC ending. GALACCO coating, an ACCO exclusive, keeps Cable-Laid Slings bright and clean and imparts maximum corrosion resistance.

SAFEST SLINGS MADE • When you buy an ACCO *Registered* CABLE-LAID SLING, you are getting safeguards that make them the safest slings you can find.

Each individual component, made from the highest quality material suited to its use, is tested before assembly. It must prove to have strength equal to or greater than the sling body. These components are then assembled into slings according to precisely-engineered designs which have proved their safety and reliability in extensive field tests.

Each completed sling is then proof-tested at twice the load-carrying capacity for which it is rated. Then, and only then, does it receive the coveted ACCO registration certificate and tag.

Get the details on Cable-Laid, or any other ACCO *Registered* Wire Rope Slings, from your distributor—or call the nearest ACCO district branch below.

*Trade Mark Registered

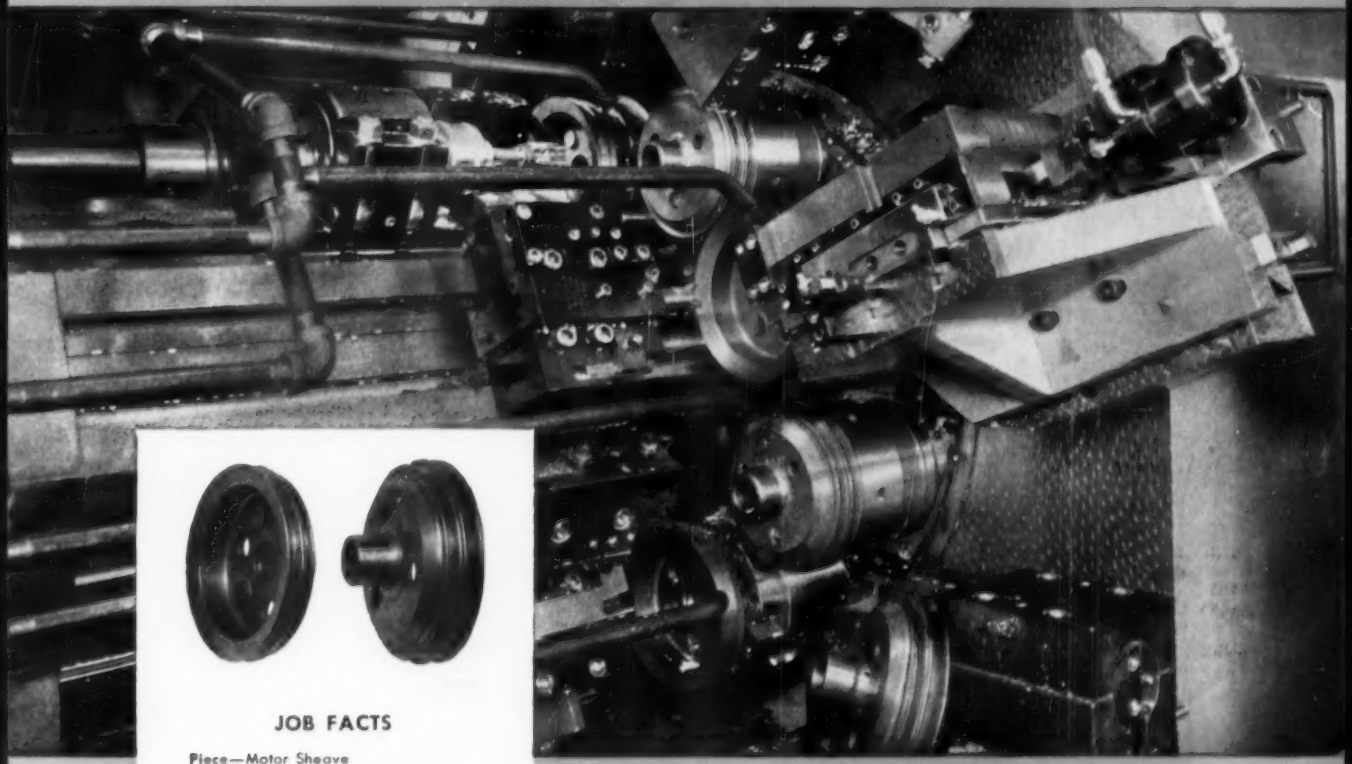
FREE FOLDER • Write Wilkes-Barre office for your copy of new folder **DH-532**, which gives strengths and weights (for six different lifts) on a full size range of ACCO *Registered* Cable-Laid Slings.

ACCO

American Chain & Cable Company, Inc., Wire Rope Sling Department

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

with an Acme-Gridley 8 SPINDLE CHUCKER...



JOB FACTS

Piece—Motor Sheave

Material—Cast iron 3½" long, 7⅜" diameter

Operations—Machine arranged for double indexing to complete both ends of piece simultaneously. 26 operations (13 on each end) including skiving. Carbide tooling used throughout.

Machine Time—49 seconds

Machine—8 inch 8 spindle Acme-Gridley chucking automatic.

Ask for our representative to tell you more about Acme-Gridley BASIC DESIGN. Meanwhile write for Bulletin CM-44 showing 25 different tooling setups on chucking jobs.

you get these advantages

Maximum production, at lowest cost per piece, is assured because of:

GREATER TOOLING FLEXIBILITY . . . the result of Acme-Gridley sound *basic* design.

DOUBLE INDEXING . . . which lets you finish *both* ends of the piece *at one time*, more accurately, with less handling—as fast as modern tools can take it.

INGENIOUS TOOLING ENGINEERING . . . that comes *only* from COMPLETE LINE experience.

National Acme

THE NATIONAL ACME COMPANY, 171 EAST 131ST STREET, CLEVELAND 8, OHIO

ACME-FETTE thread rolling costs are now as low as $0.00005 per piece—see ad on following page →→→

PERFORMANCE FIGURES WITH Acme-FETTE

thread rolling
now look even better!
would look good in any shop!
Report from Plant "J"
THE NATIONAL ACME COMPANY
RIGHT ON SCHEDULE! 4 months and another 1,000,000 pieces later, the original set of rolls are still on the job. Have you taken a close look at your threading picture lately?
THE NATIONAL ACME COMPANY
OUR JOB: to provide the Right Machine for YOUR JOB

Be sure to get Acme-FETTE figures on your threading jobs

THREADING COSTS NOW DOWN TO $0.00005 PER PIECE

National Acme

THE NATIONAL ACME COMPANY, 171 EAST 131ST STREET, CLEVELAND 8, OHIO

←←← See on preceding page how an ACME-GRIDLEY chucker machines both ends of a piece in one setup — 26 operations in 49 seconds

HARDINGE
ELMIRA, N.Y.

HARDINGE Sjogren Chucks

Quality at Low Cost

HARDINGE-SJOGREN Speed Collet Chucks for tool room lathes, engine lathes and grinders.

Available in Five sizes to suit your work requirements: 1 1/16", 1 3/8", 1 3/4", 2 1/4" and 3 1/2" Capacity

1 3/8" Capacity
Plain Back
$91.00

1 3/8" Capacity
D1-6" Cam Lock
$103.00

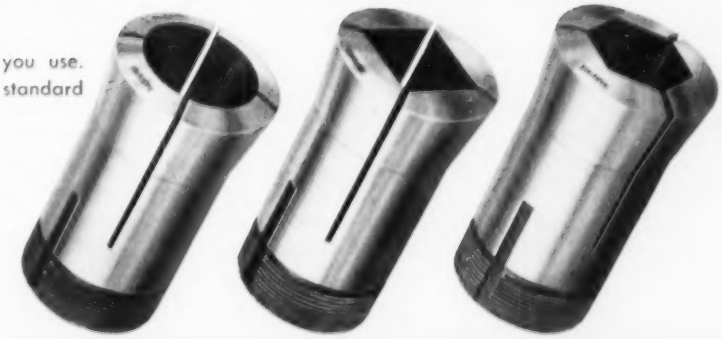
1 3/8" Capacity
No. 1 Taper Key
$107.00

HARDINGE
ELMIRA, N.Y.

HARDINGE Low Cost Steel Collets

Maximum efficiency — Pay for only what you use. Records show that 82% of all sizes used are standard 16th sizes.

Buy only the sizes you use — Hardinge Collet stocks are available in Hartford, New York, Philadelphia, Baltimore, Rochester, Dayton, Detroit, Chicago, St. Louis, Minneapolis and Los Angeles. Also, Toronto and Montreal, Canada.



HARDINGE BROTHERS, INC., ELMIRA, N. Y. U.S.A.

Mr. J. R. Weidenheimer (center), Plant Superintendent of the Lynch Corporation, and Mr. L. C. Williams (right), Gulf Sales Engineer, check the performance of Gulfcut 21 on an Acme Turret Lathe where a cam is being machined. Steel used is NE8445.

. . . GULFCUT 21 was chosen

by the Lynch Corporation, Anderson, Indiana

"We did not choose Gulfcut 21 at random," says Mr. J. R. Weidenheimer, Plant Superintendent of the Lynch Corporation, well-known glass machinery manufacturer. "Many different cutting oils were tried but Gulfcut 21 proved best in our tests. We feel that it gives better protection to the tool and contributes to a smoother machining operation."

Scores of machine shops have discovered, as the Lynch Corporation did, that Gulfcut 21 is the answer when the job calls for a sulfurized mineral type cutting oil.

One important reason for the outstanding performance of Gulfcut 21 is a special Gulf process of combining sulfur. This provides greater sulfur activity over the entire range of a cutting operation—gives the tool maximum protection and helps to reduce built-up edge. Gulfcut 21 also has excellent anti-weld characteristics and extreme load carrying ability.

Gulfcut 21 is only one of the complete line of quality GULFCUT oils that will help you get improved production and longer tool life in all your machining operations.

Call in a Gulf Sales Engineer and have him recommend the most suitable type for each specific job in your shop. He is available through your nearest Gulf office. Consult your local directory.

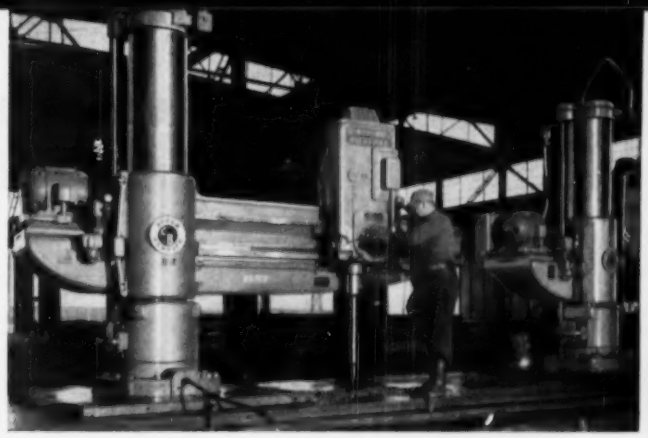
GULF

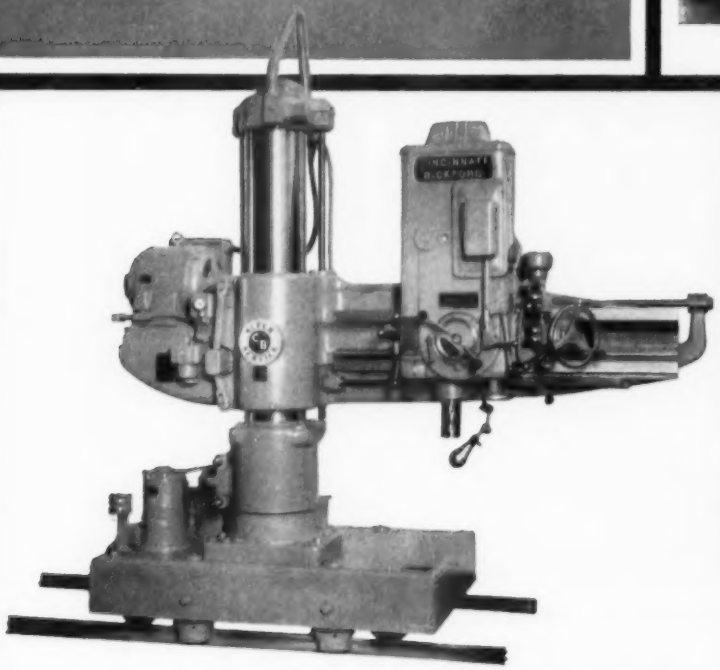
GULF OIL CORPORATION • GULF REFINING COMPANY

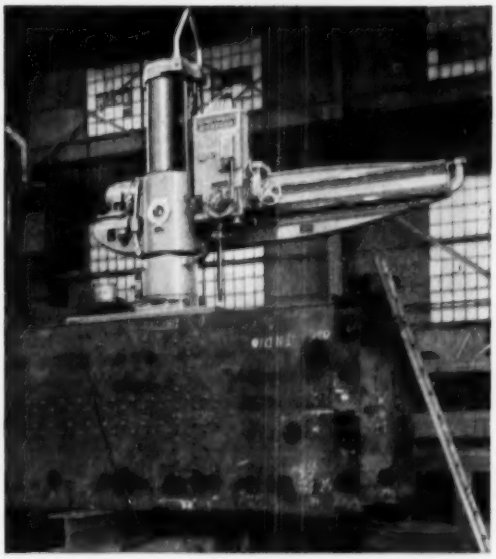
1822 Gulf Building, Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

MOVES that save you money





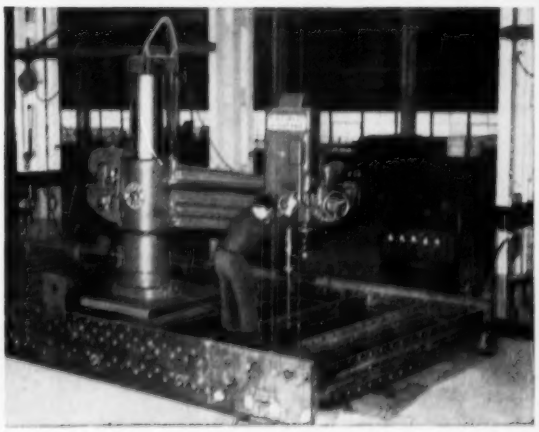


...on the large job!

These portable Cincinnati Bickford Super Service Radial Drills are effecting very large savings, up to 75% on work shown here. It is faster, more accurate and costs less to move the machine, instead of moving the work. Equipped with lifting bail, these machines are so perfectly proportioned and balanced that they need no clamping to work or floor. They do not tip or rise up while drilling.

Inquire about these portable machines—track type, sliding saddle on bed, or merely with stub base and lifting bail—they can save time and dollars for you.

Write for Bulletin R-29.



CINCINNATI BICKFORD

SUPER C·B SERVICE

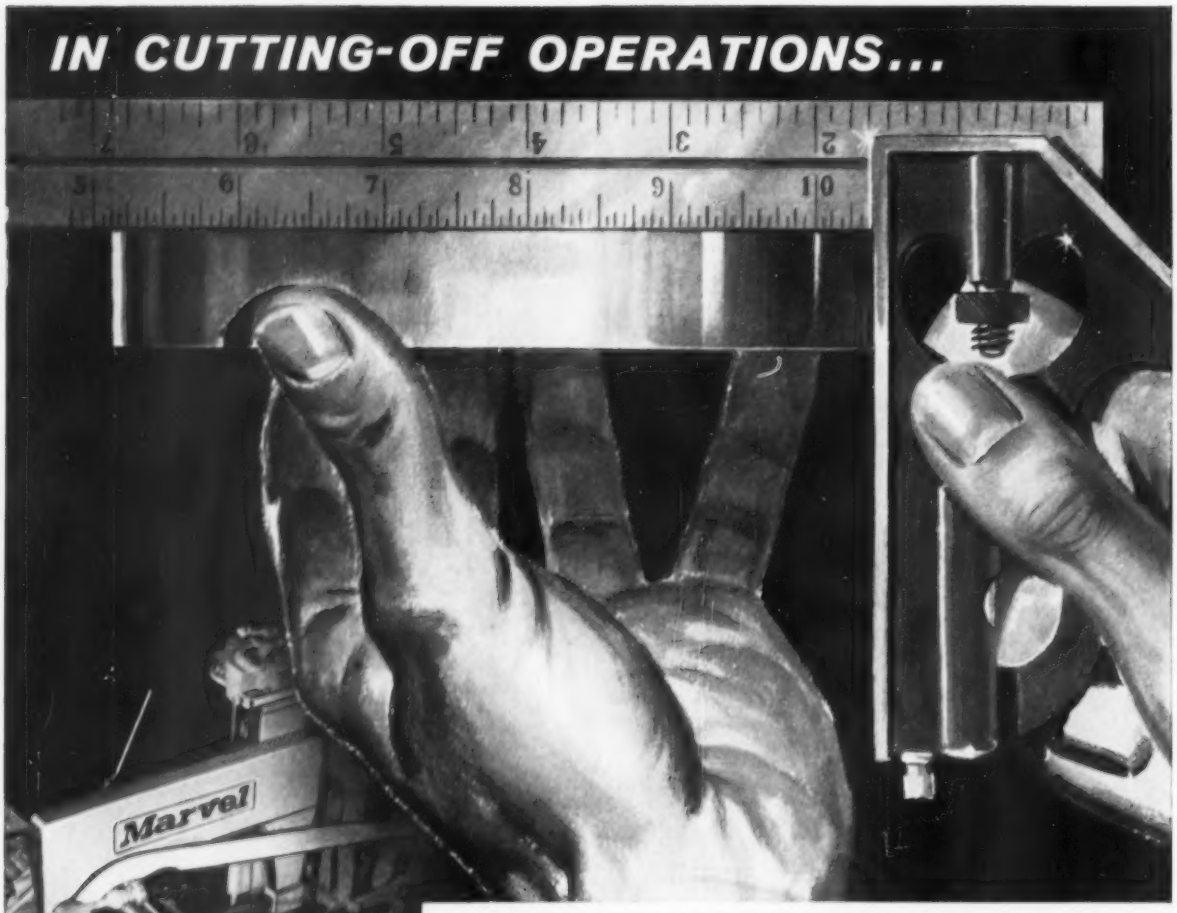
RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

OAKLEY, CINCINNATI 9, OHIO, U.S.A.

IN CUTTING-OFF OPERATIONS...



...SPEED WITHOUT ACCURACY IS COSTLY!

Efficient cut-off of steel blanks from bars demands a combination of speed *and accuracy*. MARVEL, and MARVEL alone, achieves this combination with machines capable of delivering feeds and speeds which fully utilize the strength and heat resistance of the modern high speed hack saw blade.

MARVEL dual power feed and crank lever method of reciprocation are two exclusive features designed to give increased speed and efficiency. This unique dual power feed employed on the Series No. 6 and No. 9 MARVEL Ball Bearing Hack Saw Machines, simultaneously controls both positive feed depth and feed pressure, automatically adjusting both pressure and depth of feed correctly in proportion to the number of teeth in contact with the work. This automatically forces the blade to cut as deeply as possible and practical on every stroke, without demanding the attention of the operator. As a result, the work is cut-off in the fewest possible number of strokes. Quick return of the saw frame on the non-cutting stroke, accomplished by the crank lever, delivers 33⅓% more cutting strokes per minute without increasing the blade velocity on the cutting stroke.

Accuracy is assured by the construction of the machine itself. Anti-friction ball or roller bearings are used at all load carrying points. The saw frame reciprocates on fully enclosed special design ball bearings which are factory adjusted with a pre-load, assuring permanent frictionless rigidity. Saw frame, saddle, and upright are precision machined and fitted to form a rigid integral unit capable of withstanding any cutting load with no deflection or side movement.

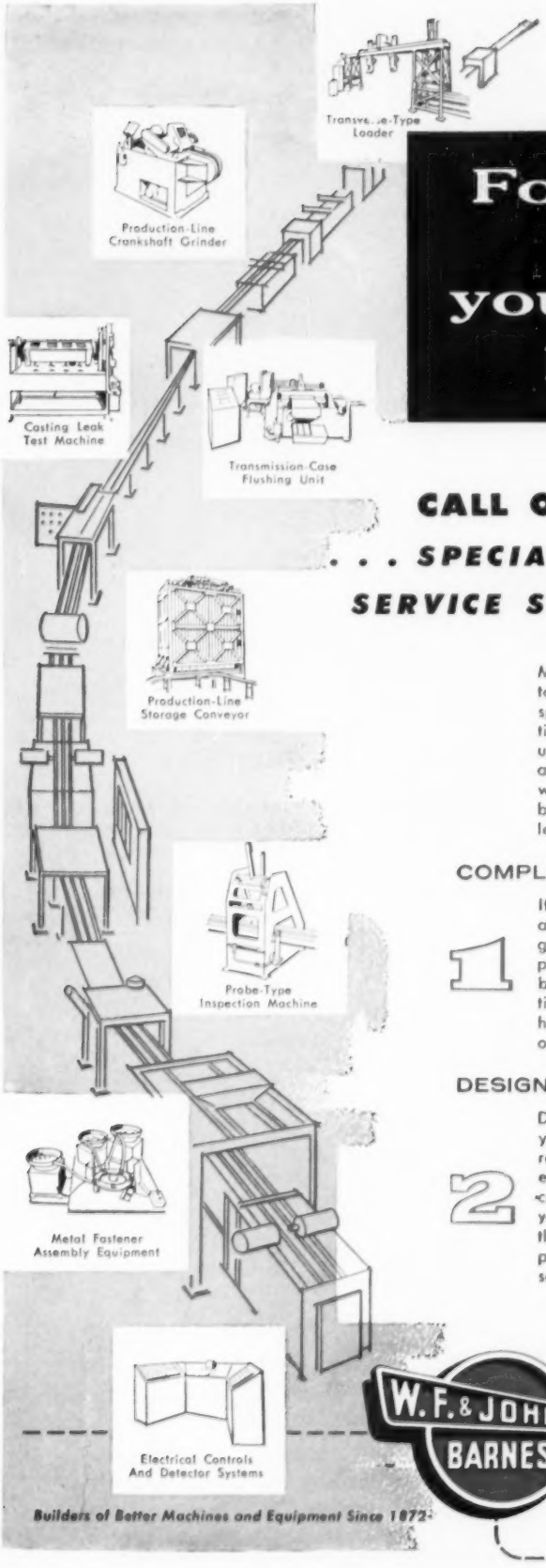
These exclusive features found only in MARVEL Hack Saw Machines, together with the unequalled performance of the unbreakable MARVEL High-Speed-Edge Hack Saw Blade, form a team that guarantees the fastest, most accurate cutting-off.

S-1300

There is a MARVEL field engineer near you capable of intelligently discussing your cut-off work. Send for catalog C-55, and the name and address of your nearest MARVEL field engineer.

ARMSTRONG-BLUM MFG. CO.
5700 WEST BLOOMINGDALE AVE. • CHICAGO 39, ILL.

Metal Cutting MARVEL SAWS
Better Machines—Better Blades



For a practical solution to your automation problems . . . .

CALL ON W. F. & JOHN BARNES

. . . SPECIAL TWO-FOLD COORDINATED SERVICE SOLVES PROBLEMS QUICKLY

More and more production executives than ever before are today turning to Barnes for help in designing and building specialized automation equipment. With 80 years of practical machine building experience, Barnes have been called upon to design and build hundreds of different types of automatic handling and special processing equipment as well as special high production machine tools. Now, to better serve demands and help you solve automation problems quickly, Barnes offers a two-fold coordinated service:

COMPLETE PRODUCTION-LINE ENGINEERING

1

If you are planning new production-line methods for either automatic or semi-automatic operations, an experienced engineering staff is available to work with you. The detailed plans and proposals submitted for your consideration can be depended upon to provide you with the latest in automation engineering and the very best of proven mechanical, hydraulic, and electrical actuation. Ask for a free survey of your problems early in your planning program.

DESIGNING & BUILDING SPECIALIZED UNITS

2

Designing and building specialized, individual units to suit your specific needs is a separate, additional service. Where required, electrical, mechanical, hydraulic, fixture, and tool engineers work together as a team. All efforts are closely coordinated with complete manufacturing facilities to save you time and eliminate divided responsibility. As illustrated, this service covers hundreds of different types of automatic processing and work-handling units that are today profitably serving a wide range of industrial needs.

ANALYSIS OF METHODS — Call on Barnes engineers today for a practical solution to your automation problems. Or, ask for an analysis without obligation.

W. F. & JOHN BARNES

Builders of Better Machines and Equipment Since 1872

AUTOMATION SECTION

413 S. WATER ST. • ROCKFORD, ILLINOIS

SPECIAL MULTIPLE SPINDLE MACHINE TOOLS • SPECIAL PROCESS EQUIPMENT • SPECIAL ELECTRICAL CONTROLS

VK

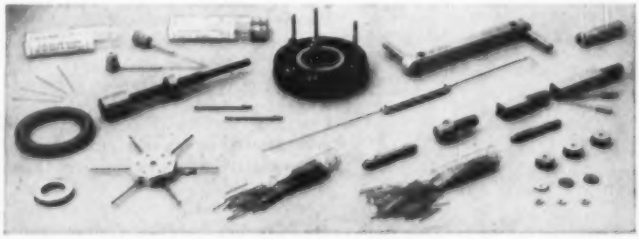
USE OUR SKILLS on YOUR LAPPING PROBLEMS

If that tough production part has Gage Characteristics, try the Van Keuren Precision Lapping Service--

The Van Keuren Co. laps optical flats to an accuracy of .000001", gage blocks to .000004", plug gages to .000010". Your job may not be this precise, but it's a safe bet that VK skills can save you money on lapping problems involving size, flatness, parallelism or fine surface finish. If that tough production part has at least one gage characteristic, ask for a quotation from VK.

We lap flat and cylindrical work in both metals and non-metals. Sealing rings and plates for pumps and pressure devices, precision pins, spacers, pistons, punches, carbide pivots, valve parts, instrument components and parts for testing inspection equipment, are among the customer items handled economically here in our plant.

If you require lapped or polished surface finishes in the order of .5 to 5.0 RMS, or dimensional tolerances from .000001" to .0001", the Van Keuren Co. can probably help on the problem. The "rule of thumb", as suggested above, is "at least one gage characteristic."



Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:

VK

37th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

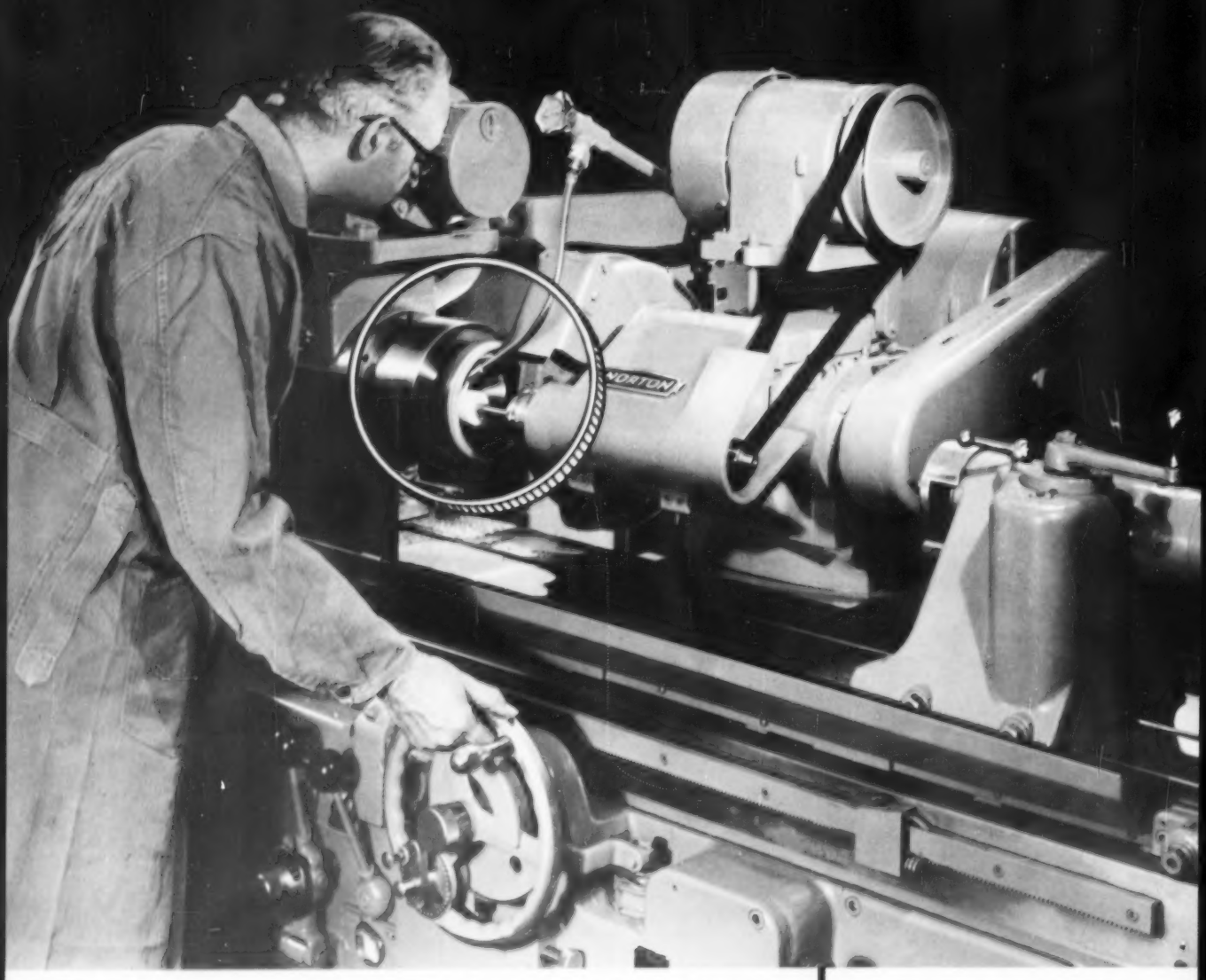
Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . . Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide Plug Gages . . . Laps and Surface Plates . . . Precision Lapping Service.

ANNOUNCING . . .

The New NORTON 14" and 18" Type U-4 Universal Grinding Machines

THEY'RE READY!

Two new Norton Type U-4 Universal Grinders



QUICK "GET-AWAY", one of the biggest advantages of the new Norton 14" and 18" Type U-4 universal grinders, shifts the time-and-money-saving "Touch of Gold" from one type of grinding to another — fast. The operator can quickly change over from this internal grinding set-up by swinging the internal grinding spindle assembly up and out of the way. Then he's ready for external, face or angular wheel slide jobs.

NEW SIZES — NEW ADVANCED FEATURES

The popular Norton Type U-4 universal grinders are now built in 14" and 18" capacities. Note optional SWIVALIGN Unit on right of machine.

...14" and 18"...feature extra versatility

...extra fast set-ups...

to bring you extra profits

Now you can get Norton Type U-4 universal grinding machines in 14" and 18" work capacities.

Designed for external, internal, face and angular wheel slide grinding — from rough cuts to finest finishing — the new grinders bring you all the famous Type U-4 features. For example:

Rapid Chucking. The swiveling headstock has a conventional dog drive plate on one end of the spindle for dead-center grinding — plus a 6" D-1 cam lock nose on the other end for mounting chucks or fixtures. You can leave a chuck on the cam lock nose and merely swivel the headstock 180° for real time savings in setting up chucked jobs.

Quick Change-Over of headstock to live or dead spindle operation.

Simple Work Speed Change in a range of 60 to 360 r.p.m. by turning a small hand wheel.

Independent Settings of Wheel and Feed for doing normally difficult jobs fast. The wheel head has swivels above and below the slide ways.

Extra Capacity in Wheel Head. Upper member of the wheel head is easily repositioned for angular slide, face grinding or other operations.

Extra Capacity in Headstock. A 1½" hole clear through the headstock spindle gives additional capacity for grinding long shafts.

Precise Swivel Table Alignment assured by the SWIVALIGN* Dual Electric Indicator, an optional extra.

***PLUS** these new advancements:*

Wide work speed range from AC power source with full horsepower over the entire speed range.

Steel-tape-type base way guards protect the ways and require no additional floor space.

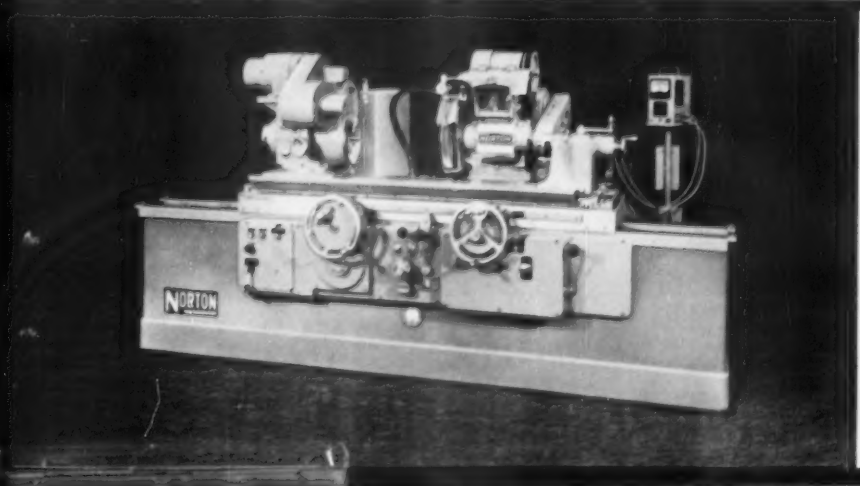
Wheel spindle runs in hard bronze bearings which enclose spindle and support over 50% of spindle body.

Footstock spindle remains in retracted position for loading.

Ask us about them

Be sure you get the whole story on these new Norton grinders. Compare them with your present grinding machines — then figure for yourself the advantages of meeting competition with the best equipment of its type ever built. See your Norton Representative or write us direct. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



NORTON

Making better products

. . . to make

your products better

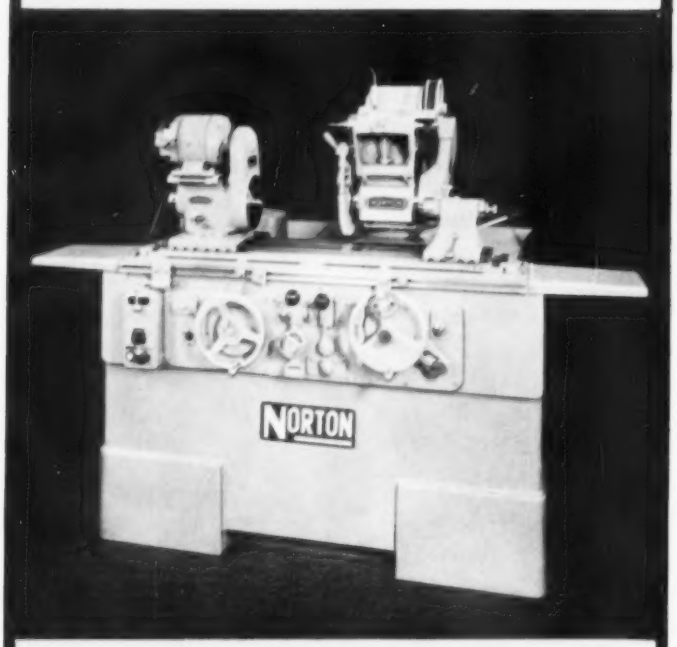
machine.

. . . and now meet two other top performers in the complete line of Norton Universal Grinders

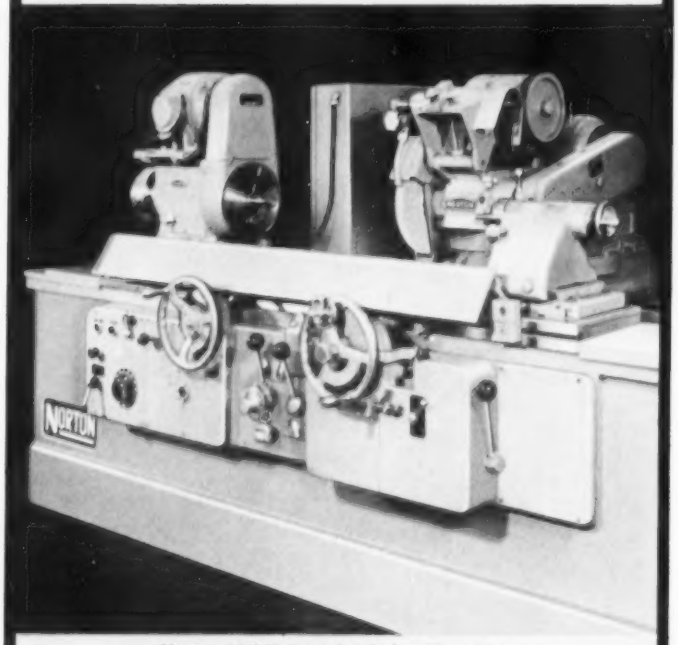
The preceding pages told you about the Norton 14" and 18" Type U-4's — two new additions that complete the Norton line of universal grinders for the broadest range of practical usefulness.

From the smallest 10" machine to the newest, largest 18" Type U-4, Norton universal grinders have one common denominator — top performance.

You can depend on them for speed, versatility and precision accuracy over the widest range of different grinding jobs. And like all Norton grinders and lappers — the world's largest line — they bring you the true "Touch of Gold" — the Norton extra that adds value to your products and cuts your production costs.



Norton 10" Universal Grinder



Norton 12" Universal Grinder, Type U-4

To Economize, Modernize With **NEW**

NORTON

GRINDERS and LAPPERS

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories

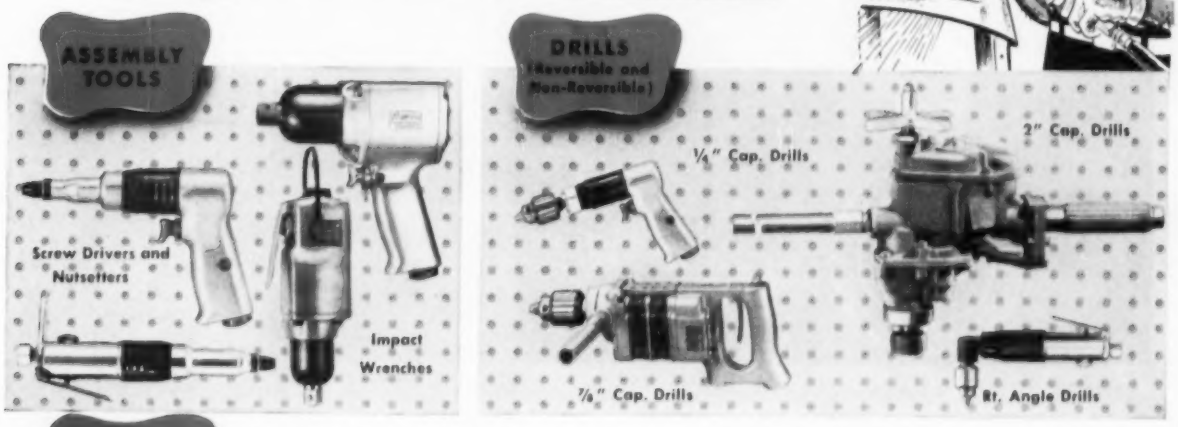
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones
Behr-cat Tapes

Printed U.S.A.

District Offices: Worcester • Hartford • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto

What's your portable tool problem?

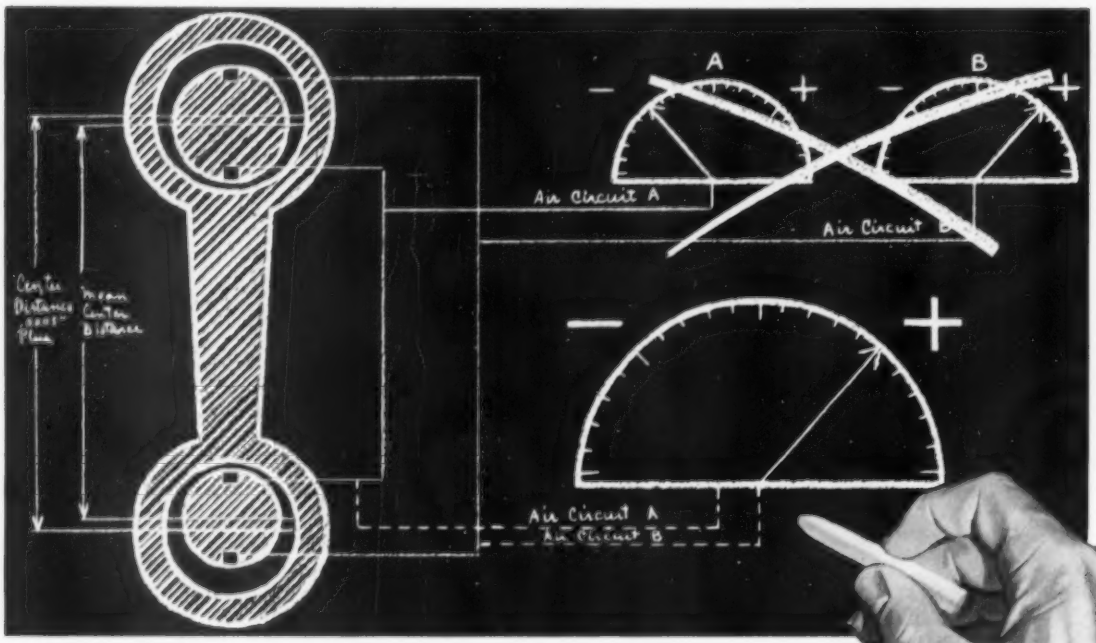
THERE'S A POWERFUL ROTOR TOOL TO DO IT *FASTER!*



● Write for Bulletin 53 giving specifications on complete line of Rotor Tools for all industry. The ROTOR TOOL Company, Cleveland 32, Ohio.

ROTOR TOOLS
CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



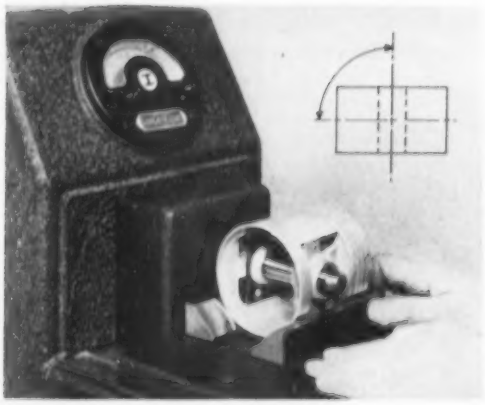
NOW! Gage Center Distance with Just One Dial

...using a Taft-Peirce Comp-U-Tair*

Gage parts twice as fast — and far more easily — with this exclusive T-P *computing* air gage . . . the Comp-U-tair.

Checking a dimensional relationship like center distance, for example, is greatly simplified. The Comp-U-tair measures, computes, and indicates the result on a *single* indicator with *one* pointer. The Comp-U-tair is a *differential air gage*, in which two air circuits are applied to opposing sides of the differential device. Gaging nozzles are placed so that diameter variations cancel each other and have no effect on true center distance reading. Operator reads just one dial, does no calculating, and has an instant, positive indication for every part — in or out of tolerance, plus exact amount and direction of variation.

Streamline your gaging with the unique Comp-U-tair. Call Taft-Peirce to save time and money throughout your inspection operations. As a starter, write for Air Gage Catalog No. 613.



The Comp-U-tair does many other jobs . . .

One big time-saver is measuring squareness, shown above. Squareness is indicated on one *dial* with one *pointer*. The Taft-Peirce Comp-U-tair figures as it measures, can be designed to check several dimensional relationships *simultaneously*. Number of dials is cut in half . . . inspection is faster, more accurate.

*Patent Pending

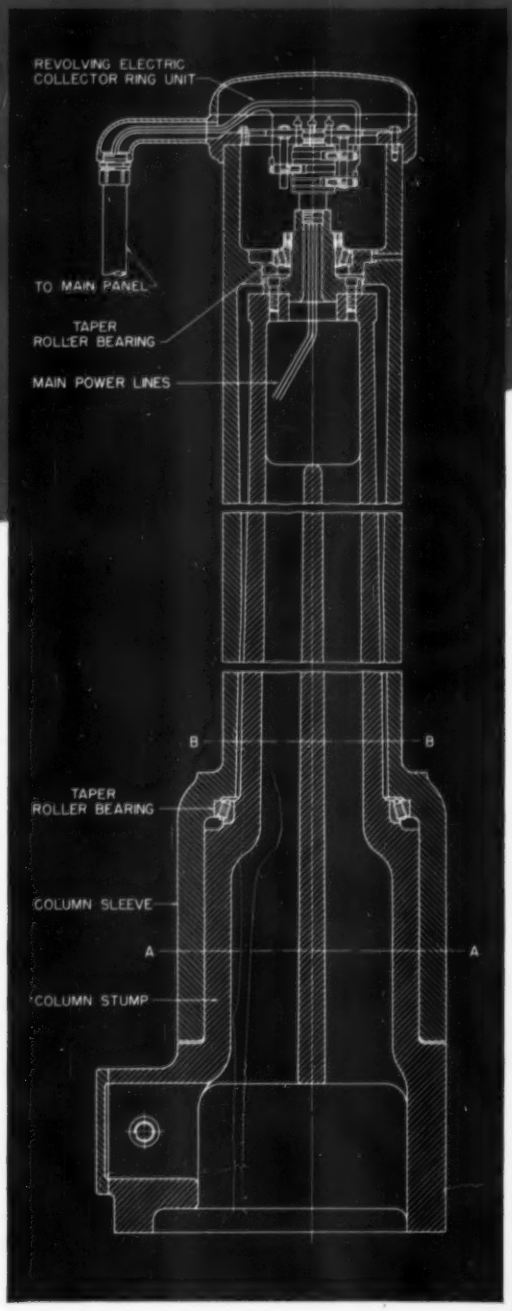
THE TAFT-PEIRCE FAMILY...

- Magnetic Chucks
- Precision Gages
- Air Gages
- Grinding Machines
- Lapping Machines
- Tool-Room Specialties

TAKE IT TO TAFT-PEIRCE

TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

Rigidity Increased 50%



New thrust resistant, "TIMKEN" mounted column and sleeve assembly.

The new "TIMKEN" mounting of the column and sleeve on the new model 32-speed Hole Wizard Radial has hit the "jack-pot" for rigidity. It's the stiffest, most resistant column unit we've ever known.

Under drilling tests up to 30 horse power deflection has been cut in half over former models. It's truly a marvel of rigidity.

Large Timken bearings at top and bottom when preloaded bind the column and sleeve into the equivalent of a solid unit for resisting functional stresses and cuts arm deflection to an absolute minimum. This definitely results in greater accuracy and longer cutting tool life. To further increase resistance to stresses the column sleeve departs from conventional design by employing a tapered inner wall providing an unusually heavy section where the greatest functional stresses are concentrated.

A new "NON-CREEP" clamping mechanism in combination with a solid column sleeve cuff adds greatly to the rigidity of this new "AMERICAN" Radial.

Write for Bulletin No. 328 for the complete story of More and Better Work at Lower Cost.

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

NOW! THOR INCREASES POWER OF NEW AIR GRINDER

50%

THOR'S new 7½ pound vertical air grinder is more powerful, more versatile. It can save time and money in your operation. Check these features to see how:

Completely streamlined, one piece housing encloses everything but spindle and sanding disc or cup for easier, safer handling.

Available at three basic speeds—4500, 6000, or 8000 r.p.m's.

All models supplied with four position throttle for operator convenience.

Can accommodate sanding discs up to 9" diameter, depressed center wheels up to 7" diameter, cup wheels and wire brushes up to 6" diameter.

Handles spaced at 110 degree angle to facilitate operator handling, lessen fatigue.

Extremely quiet exhaust.

Thor quality construction includes:

Automatic mist oiling for all moving parts from a large capacity reservoir • new, adjustable type positive speed governor, long lasting, easy disassembly for maintenance inspection • spindle is mounted on double row, pre-loaded ball bearings to take thrust of extra power • lower bearing grease fitting • hardened steel center plates • clamped rotor to prevent wear on end plates • very low air consumption.

For price or more complete information on your own particular application contact your nearest Thor factory branch listed below.

Cup grinding wheel with stationary guard

6" wire brush with stationary guard

Thor PORTABLE POWER TOOLS

9" sanding disc

Depressed center wheel

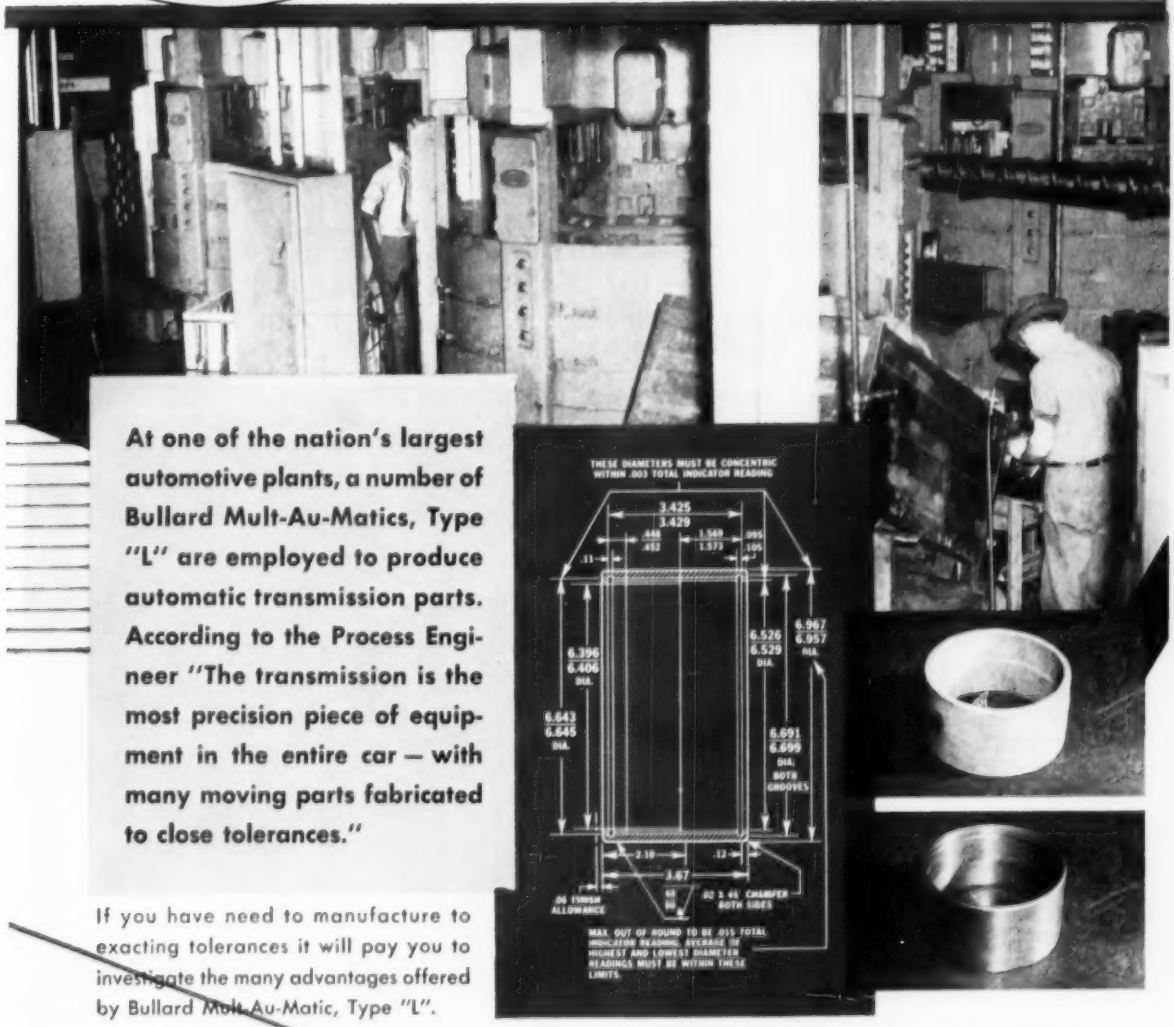
THOR POWER TOOL COMPANY, AURORA, ILLINOIS

Atlanta • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • Milwaukee • Newark • Long Island City, N.Y. • Philadelphia • Pittsburgh • St. Louis • San Francisco • Seattle • Toronto, Canada • Export Division, New York City

Automobile Manufacturer produces

Repetitive Pieces to Close Tolerances with

BULLARD MULT-AU-MATIC Type "L"



At one of the nation's largest automotive plants, a number of Bullard Mult-Au-Matics, Type "L" are employed to produce automatic transmission parts. According to the Process Engineer "The transmission is the most precision piece of equipment in the entire car — with many moving parts fabricated to close tolerances."

If you have need to manufacture to exacting tolerances it will pay you to investigate the many advantages offered by Bullard Mult-Au-Matic, Type "L".

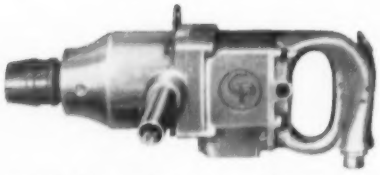
Send for catalog today

THE
BULLARD
COMPANY
BRIDGEPORT 9, CONNECTICUT

THE BULLARD COMPANY
286 CANFIELD AVENUE — BRIDGEPORT 9, CONNECTICUT
Please send me a copy of the
NEW MULT-AU-MATIC, TYPE "L" CATALOG

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

SAVE TIME "ON THE LINE" *with* CP Air and Electric Impact Wrenches



CP-610-RP Reversible Air Impact Wrench with pistol grip.

CP-3440-RS Reversible Air Impact Wrench with ½" sq. drive shank.

CP-903R Kit-Packed Electric Impact Wrench with ½" square drive.

2000 blows per minute give the CP-903-R Universal Electric Impact Wrench fast, powerful impact action. Nose section measures only 2" in diameter . . . affords easy access to tight, hard-to-get-at spots. Has rated ⅜" bolt size capacity but handles many ⅝" applications. Available with carrying case containing six hex sockets and drill and tap chuck.

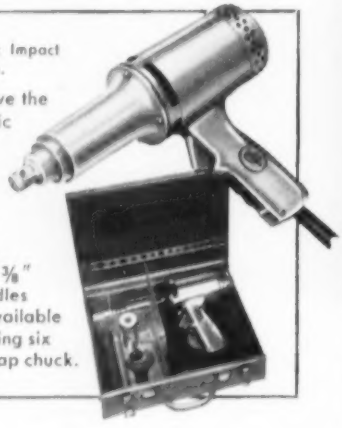
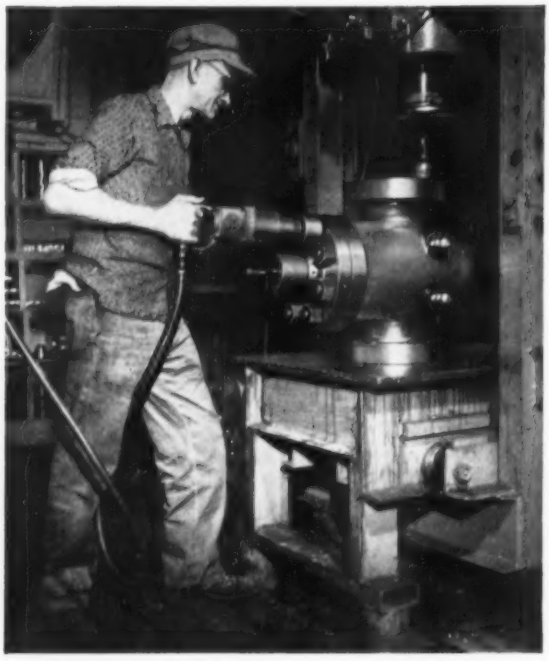


TABLE OF CAPACITIES

Wrench Number	Bolt Size
AIR	
CP-337	¼"
CP-334	⅜"
CP-3440	⅜" heavy-duty
CP-349	⅝"
CP-3490	⅝" heavy-duty
CP-360	¾"
CP-3630	¾" heavy-duty
CP-610	1¼"
CP-375	1¾"
ELECTRIC	
CP-903-R	⅜" - ⅝"

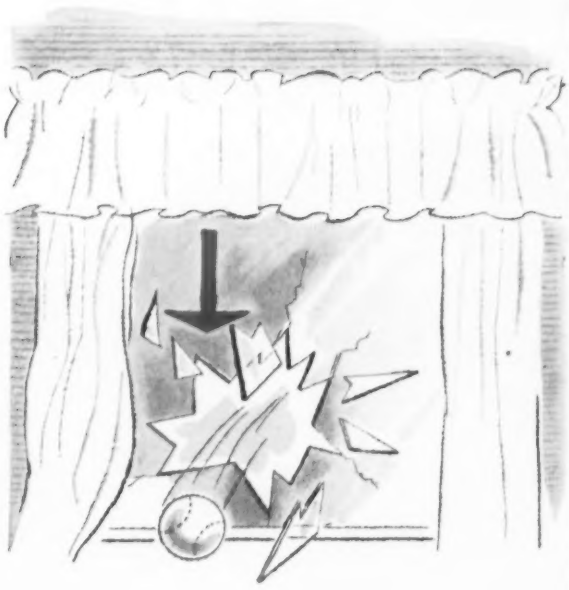


Check the fast-moving, smooth-running production lines in industry and you'll find Chicago Pneumatic reversible Air Impact Wrenches at work, stepping up output, stepping down costs. You'll find Air Tools like the CP-610 saving 25% to 75% of nut running and removal time. You'll find angle head models in all sizes, adding ease to jobs that are normally awkward and hard-to-reach. Other CP Air Wrenches available in capacities from ¼" bolt size to 1¾". Pistol, spade or side handle models are available.

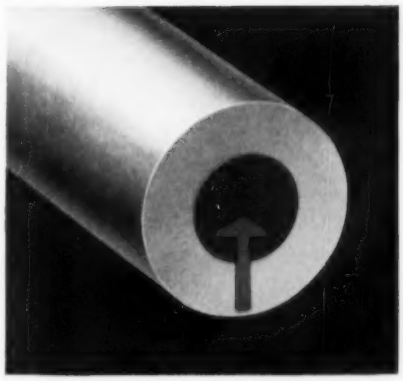
Chicago Pneumatic

8 East 44th Street, New York 17, N. Y.

Pneumatic Tools • Air Compressors • Electric Tools • Diesel Engines
Rock Drills • Hydraulic Tools • Vacuum Pumps • Aviation Accessories



a hole here means work...



a hole here saves work

Crucible Hollow Tool Steel Bars take much of the work out of making ring-shaped steel parts, or tools with a center hole. The hole's already there. You save expensive drilling, boring, cutting-off and rough-facing operations . . . you reduce machine time and scrap losses.

You can now get Crucible Hollow Tool Steel Bars in any of the famous Crucible tool steel grades, in virtually any I.D. and O.D. combination. And you can get *immediate delivery* from stock of the five most useful grades — KETOS oil-hardening . . . SANDERSON water-hardening . . . AIRDI 150 high-carbon, high-chromium . . . AIRKOOL air-hardening . . . NU DIE V hot-work tool steels.

Your Crucible representative can quickly show you how Crucible Hollow Tool Steel Bars will save you work and money. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

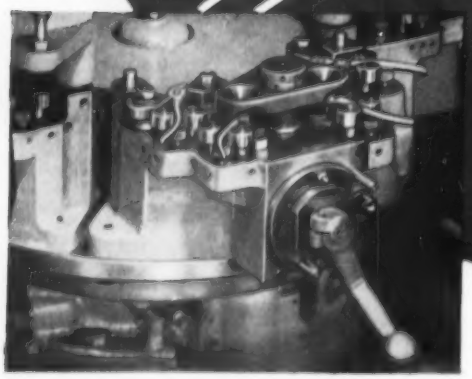
Crucible Steel Company of America

How would you take hold of this job to produce 426 parts per hour gross at 1 5/10c per part?

WIRE CUTTER HALVES

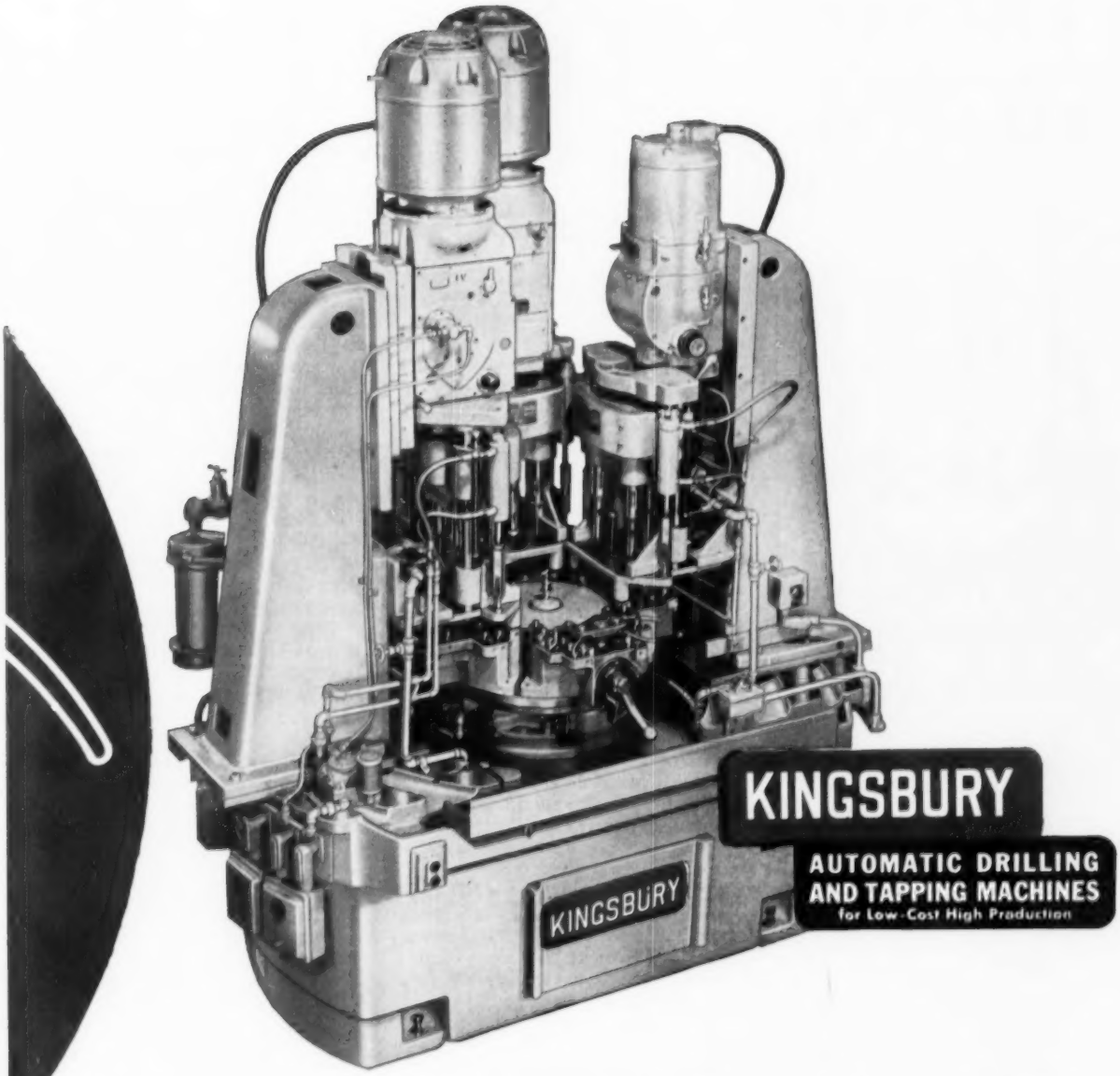
Steel Forging

426 pieces per hour gross - 1 5/10c per piece



"Operations Kingsbury"

Close-up of one of the four work-holding fixtures, each of which presents four plier halves for accurate drilling, boring, reaming and countersinking operations — to the tune of 426 parts per hour gross.



produce more parts, accurately, for rapid assembly

There's no room for *play* in a pair of pliers — no room for waste in their manufacture. All *like* halves must be interchangeable.

These requirements call for *precision with speed* — obviously a job for controlled multiple operations.

Print called for work on each side of two halves. It was decided to accomplish this with two chuckings, each work-holding fixture holding 4 parts — two lefts and two rights. In the first chucking, vertical units at Stas. 1, 2, 3 drill, ream and countersink the axis hole.

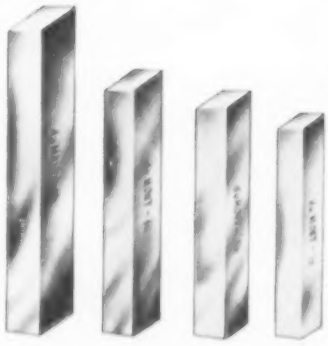
At Sta. 4 each part is turned over and placed in the second chucking. Two new parts are placed in the first chucking.

On the second and succeeding cycles all four parts are worked upon simultaneously. Stas. 1, 2, 3 rough- and finish-bore and countersink the parts in the second chucking, while parts in the first chucking are drilled, reamed and countersunk.

This uniform accuracy is not as simple as it sounds. Each of the four work-holding fixtures must be identical to locate each piece correctly at every station. This precision, this careful planning, is characteristic of Kingsbury machines, *custom-built at Keene, New Hampshire.*

Kingsbury Machine Tool Corp.
119 Laurel St., Keene, N. H.

BEST BUY
because they're
BALANCED



duMONT TOOL BITS

An almost perfect balance of *toughness, wear resistance* and *heat resistance* gives duMONT Tool Bits a definite edge in cutting life, gives you more cuts per bit, more cuts per dollar.

Clip the coupon to get full information on duMONT High Speed TOOL BITS, Ground Square and Rectangular.

The duMONT CORPORATION
Greenfield, Massachusetts

MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST A to

Name .....

Company .....

Address .....

Letters . . .

To American Machinist
330 W 42nd St, N Y 36, N Y

Who Will Pay?

Your article on Building Block machine tools is certainly timely and very well written, although we had good ideas on the subject nearly 30 years ago. There is no question, in my opinion, that there will be more "unitized" machine tools in the future. We built some, years ago, and are now designing some slide and quill feed units for future use in transfer-type drilling and tapping operations. It will be necessary, economically, to have this type of design in order to be competitive. However, I feel it will apply mostly to drilling, tapping, and similar operations, at least at the start.

The problem of having all manufacturers' units the same, as far as basic dimensions are concerned, is no doubt desirable from the user's standpoint, but is not easy to obtain. There would be differences of opinion to be resolved and a lot of redesign to be paid for. Who would pay? And where are the engineers?

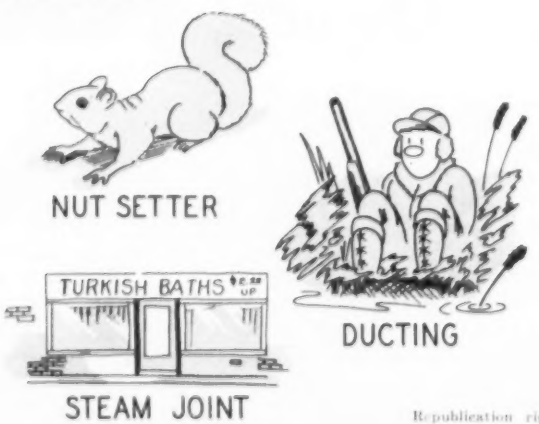
So far as other types of machines are concerned, such as horizontal broaches and grinding machines, the problem does not apply.

When you consider the millions of parts turned out per year on the productive equipment, the cost of the equipment itself becomes very small. Add to this the fact that the units wear out and become obsolete in design, and you further weaken the case. Actually, if the automotive industry would better plan its programs, so that engineering of the product is complete and final before equipment procurement is started, there would be little problem or delay in providing the necessary equipment.

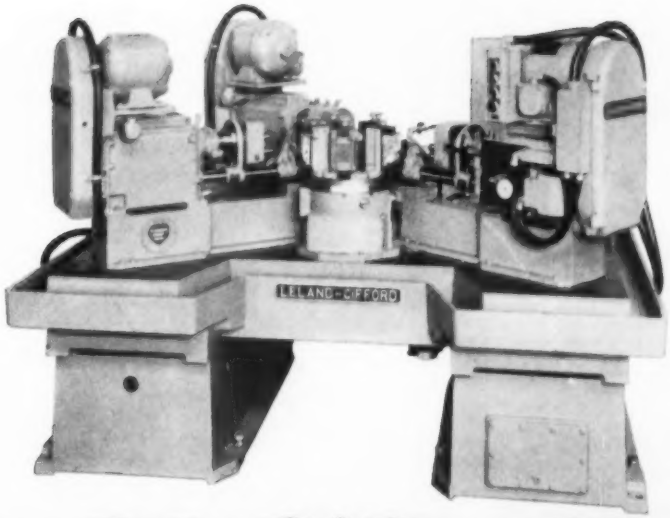
Of course, there are advantages in interchangeability, but it will

GRINETICS

By D G SMITH



Republication rights reserved

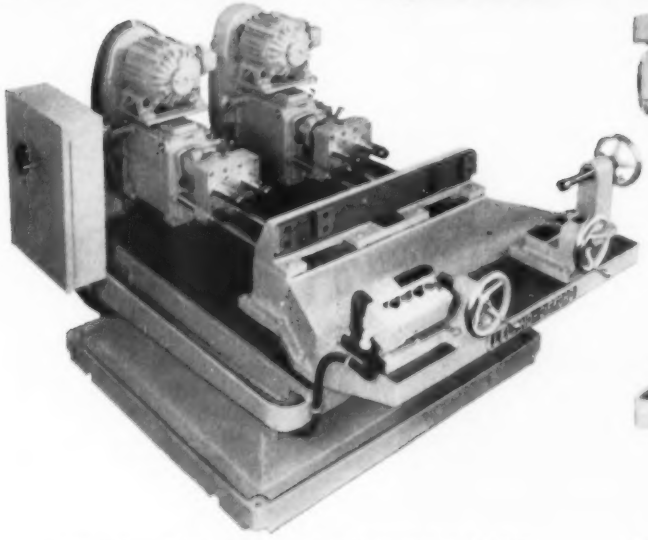


Mechanize Hand Operations

THE JOB — Drill and ream four holes on the face and two ends of automatic transmission valve body.

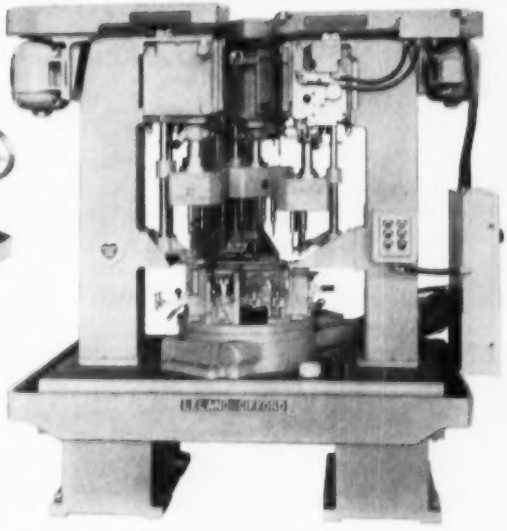
THE SETUP — Three No. 2 self-contained deep hole units with 2-spindle multiple heads and a 5-station hydraulic indexing station. Production: up to 120 pieces per hour.

LELAND-GIFFORD *Special Drilling Machines*



THE JOB — Drill and ream two .750/.751 dowel holes in 4 and 6-cylinder engine blocks.

THE SETUP — Two No. 3 self-contained units with 2-spindle heads mounted on a special base with work holding and positioning fixture.



THE JOB — Drill and ream 9 holes in one face and 2 deep angular holes in one side and one end of a control valve housing.

THE SETUP — One No. 3 and two No. 2 self-contained units with multiple heads vertically mounted over a 2-station automatic indexing table.

Contact the office nearest you for help with your drilling problems.

LELAND-GIFFORD
Drilling Machines
WORCESTER 1, MASSACHUSETTS, U.S.A.

CHICAGO 45
2515 West Peterson Ave.
DETROIT
10429 West McNichols Rd.
CLEVELAND 22
P.O. Box 853
NEW YORK OFFICE
75 South Orange Ave.
South Orange, N. J.
LOS ANGELES OFFICE
2620 Leonis Blvd.
Vernon 58, Cal.
INDIANAPOLIS 6, P. O. Box 1051
ROCHESTER 12, P. O. Box 24, Charlotte Station

WALKER....

and a great industry

For more than fifty years automotive production has relied on Walker holding devices. One of the most popular chucks in the Detroit area is Walker 617 CG (concentric gap) type, a rectangular chuck that combines longitudinal and transverse gaps. Produced in sizes to meet all holding requirements.

Walker engineers can solve any holding problem.

What is yours?

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

Original Designers and Builders of Magnetic Chucks

PIONEERING IN MAGNETISM

The longest and broadest experience is yours when you specify a Walker Chuck, for it was nearly seventy years ago that O. S. Walker produced the first successful Magnetic Chuck. Since then, the know-how in magnetic holding devices has been evident in countless applications of rectangular, swiveling, rotary and special type chucks. And, within the last decade, the O. S. Walker Company engineers have perfected Special Vacuum Chucks to harness atmospheric force to all non-magnetic materials. The Walker line also includes, Demagnetizers, Planer Parallels, and all types of Special Magnetic Lifts.

Walker engineers, ready to help you with your holding and lifting problems, are always as near as your telephone, Worcester, Massachusetts—PL 6-6293.

probably come about by slow evolution, not revolution.

Name Withheld

Everything But the Squeal

The article entitled "Waste Not, Want Not" (*AM*—June 4 '56, p98) written by Mr Timmons, brings to my mind a curious condition that prevails in the Sardine Canning industry, "that the fish we eat are less valuable than the oil and the can in which they are contained."

In these days of high production, the regrinding of throw-away blanks is not only impractical from a cost viewpoint, but doing so would render the insert incapable of supporting the cut.

One of my customers, using triangular throw-away inserts in a negative-rake tool, gets six cutting edges with a right-hand tool, six more with a left-hand tool, six chamfering cuts with the sides of the insert, and then brazes the "much used" carbide to a steel shank for general utility purposes.

If this is wasteful, Mr Timmons, so was Ebenezer Scrooge before Tiny Tim brought about his reform.

John J English
Detroit

Justifiable Pride

We read with great interest the timely article, "Centralized Coolant Filtration Cuts Tool Cost, Increases Production 15%" (*AM*—July 2 '56, p88). It gives us great pride to tell you that the filtration equipment that made these savings possible was manufactured by the United States Hoffman Machinery Corp, 103 Fourth Ave, New York 3, NY.

R L Stephenson,
vice-president

Museum Pieces

The United States National Museum, Washington, DC, is enlarging its collection and exhibits for its new Hall of Tools. It is planned to have an historical series of exhibits showing the development of hand tools, mechanical tools, power tools, precision tools, and automatic tools.

The museum would like to obtain originals, models, or replicas of old tools that would be included in these categories, especially of those tools which mark a fundamental advance in tool development. Tools of which the date and maker can be adequately documented are especially desired. It would also like to obtain drawings, photos, plans, etc, of old tools, as well as collections of professional papers, photos, etc, of men and firms who played important parts in the development of the tool industry.

The museum would also be interested in obtaining similar material for first development models of new tools which promise to be of historical significance.

The aims of the museum in these collections are to make possible adequate and correct recording of the history of the tool industry and, in its exhibits, to demonstrate to the public the central place held by tools and the men who invested and made them in the development of our industrial society.

Please address all replies to:

Robert S Woodbury
Curator, Division of Engineering
U S National Museum
Smithsonian Institution
Washington 25, D C

STUPALOX

Sintered Oxide

CUTTING TOOLS

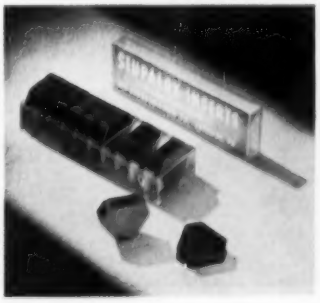
OUTPERFORM OTHER CUTTING TOOLS TWO TO TEN TIMES!

Deeper cuts, faster speeds, greater hourly production, machining the "unmachinable"—these are typical results discovered in scores of tests of STUPALOX versus other cutting tool materials.

Comparative performance studies of various tools in production shops, under normal operating conditions, brought out the relative abilities of each material. In these tests, STUPALOX outperformed other tools TWO TO TEN TIMES! In many cases, the full potentialities of STUPALOX could not be realized because of the limitations of power, or the rigidity of the machines in which the tests were performed.

As a direct result of these tests, a number of companies have already standardized on Stupalox tools, with gratifying improvements in machining costs and production.

Stupalox tools are available in several styles and sizes of inserts, and in commercial quantities. We will be glad to send you specific information on experiences with Stupalox for machining a wide variety of ferrous and non-ferrous metals.



HANDY PACKAGE...
This compact plastic box contains ten Stupalox sintered oxide tool inserts.

STUPAKOFF DIVISION OF
The CARBORUNDUM Company
WRITE DEPT. AM LATROBE, PENNSYLVANIA

REPUBLIC

to help you push back

Republic—world's largest producer of aircraft steels—is ready to help you in two ways. First, with the materials needed to combat heat as well as strength-to-weight and corrosion problems. And second, with metallurgical service backed by over a quarter century of experience gained through helping hundreds of designers and manufacturers in all types of industries meet and solve similar problems.

To date two materials, titanium alloys and stainless steels, best qualify to meet the severe service requirements for skin of aircraft and missiles flying at supersonic speeds.

Republic melts and rolls titanium in all forms—forging billets, hot rolled and cold finished bars, plate, sheet and strip.

REPUBLIC STEEL

NEW DEVELOPMENTS create new uses. A unique tank truck with one compartment made of ENDURO Stainless Steel safely handles a corrosive alcohol-water mixture used in turboprop engines. Another compartment, for kerosene, is fabricated from Republic High Strength Steel for extra strength without added weight.

WEIGHT—On the DC-7 superliner, a weight saving, equivalent to one passenger and his luggage, resulted when Titanium replaced other materials normally used in nacelle construction. And with no sacrifice in strength or safety. Titanium offers the highest strength-to-weight ratio of construction metals.

SOLVING HEAT PROBLEMS is old stuff for ENDURO Stainless Steel. ENDURO's ability to withstand heat without loss of strength has been proved on jet engines where it is used for structural and burner components, rings, exhaust systems, afterburners. Now it is being used for skin material to resist high temperatures at supersonic speeds.

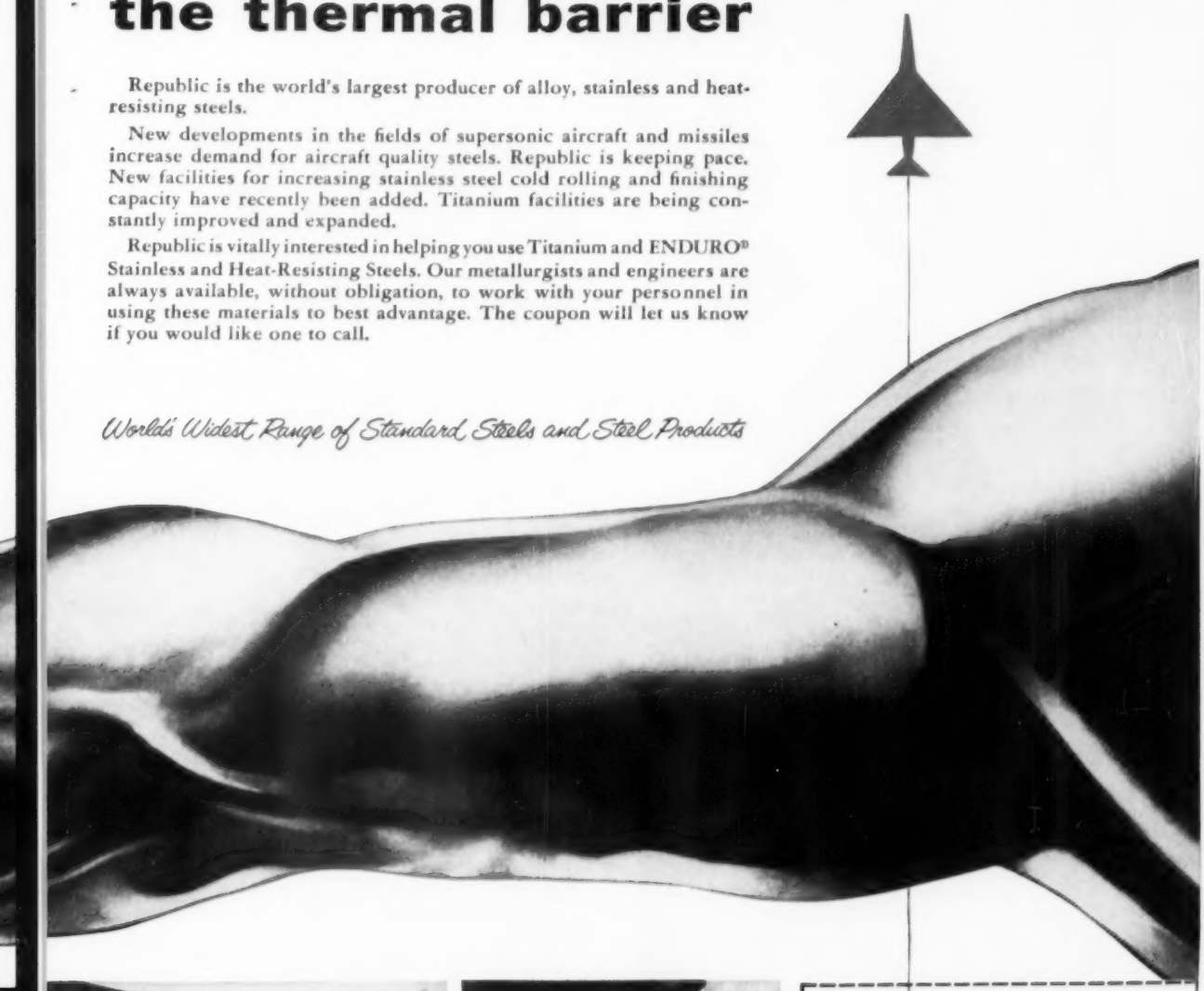
STEEL IS READY
the thermal barrier

Republic is the world's largest producer of alloy, stainless and heat-resisting steels.

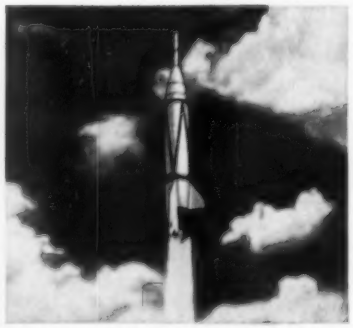
New developments in the fields of supersonic aircraft and missiles increase demand for aircraft quality steels. Republic is keeping pace. New facilities for increasing stainless steel cold rolling and finishing capacity have recently been added. Titanium facilities are being constantly improved and expanded.

Republic is vitally interested in helping you use Titanium and ENDURO® Stainless and Heat-Resisting Steels. Our metallurgists and engineers are always available, without obligation, to work with your personnel in using these materials to best advantage. The coupon will let us know if you would like one to call.

World's Widest Range of Standard Steels and Steel Products



STRENGTH—Landing gear fabricated from Republic Alloy Steels can take the tremendous strain when aircraft hit the runway at high speeds. These fine steels provide the high strength and toughness needed to withstand high impact and heavy loads—provide the hardenability to resist wear at bearing surfaces.



CORROSION-RESISTANCE—Titanium's extremely high corrosion-resistant properties make it attractive for many applications, such as tanks for acids used in combination with missile fuels. Nitric acid has negligible effect on Titanium. It is practically immune to salt water and sea air corrosion.

REPUBLIC STEEL CORPORATION
Dept. C-2244
3102 East 45th Street
Cleveland 27, Ohio

Send more information on these Republic products.

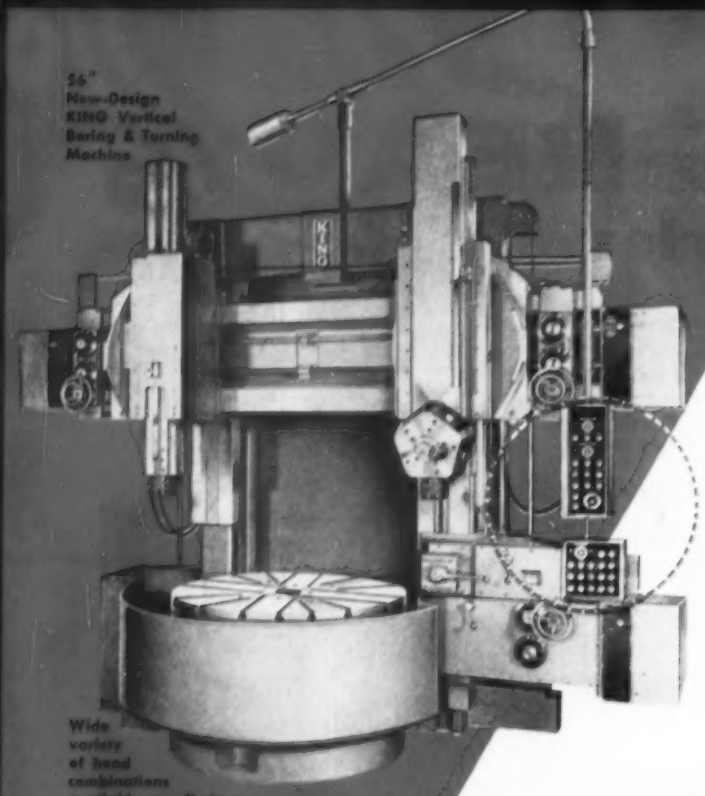
- ☐ ENDURO Stainless Steel
- ☐ High Strength Steel
- ☐ Alloy Steel
- ☐ Titanium
- ☐ Have a metallurgist call.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

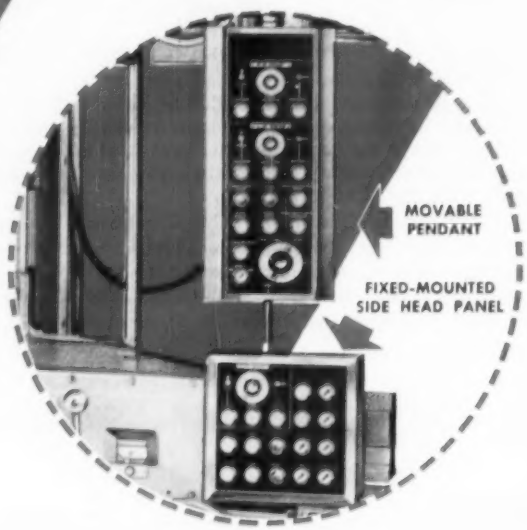


56" New-Design KING Vertical Boring & Turning Machine

Wide variety of head combinations available on all sizes

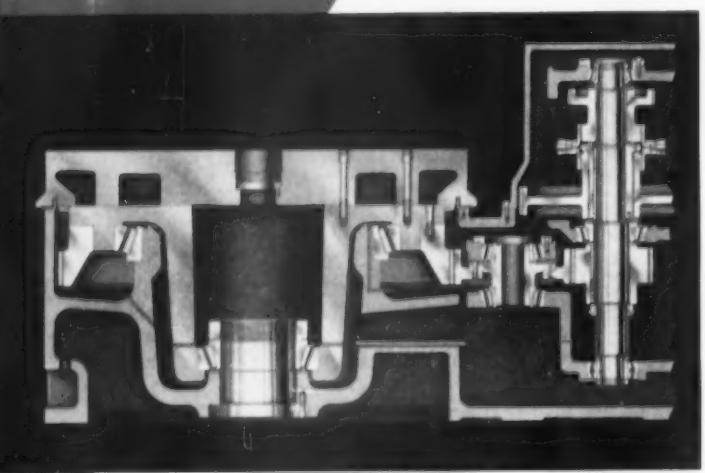
New-Design

KING



Full Electrically Operated

. . . gives you faster production at lower costs!



OUTSTANDING NEW SPINDLE MOUNTING

As shown in drawing, the spindle itself is extra heavy and rigid. Tapered roller, pre-loaded bearings are located so as to provide maximum spread, both radially and vertically, on the spindle. This construction greatly increases stability of the mounting. Note also that the drive is of helical-gear type, eliminating any tendency toward spindle deflection and loss of accuracy—a tendency always present with bevel gearing.

Full electrical operation has been engineered into these streamlined New-Design KING® Vertical Boring & Turning Machines. Control manipulation is cut to a bare minimum, speeding set-up time. Direction of all head movements is established by simplified "up-down" and "in-out" switches. Spindle speeds and feeds for all heads are pre-selective from direct-reading dials, conveniently located on the movable pendant and fixed side head panel, as are all other electrically operated controls.

Increased horsepower plus expanded speeds and feeds will remove metal at rates that take fullest advantage of the most modern cutting tools. Improved spindle operation, with resultant increased accuracy, is assured by many advanced construction features as illustrated in drawing at left. Integral drive construction permits removal of the entire drive as a unit, for easy maintenance.

These and other superior advantages in the new KING machines will greatly increase both accuracy and productivity on your boring, facing, and turning work. For full details see your King Distributor, or write us direct.

AMERICAN STEEL FOUNDRIES, KING MACHINE TOOL DIVISION
1150 TENNESSEE AVENUE, CINCINNATI 29, OHIO

KING Vertical Boring and Turning Machines

Spot news...

- **Cost of producing a gas-turbine wheel will shortly be slashed to $10** at one automaker's plant, where per-wheel cost has already been cut to $25 by employing investment casting. And no critical materials are used!
- **"Sandwich construction" of lathe headstocks,** permitting putting in larger spindles if necessary for ceramic tooling, has recently been developed. Feed-train gearbox goes on top, spindle housing and gear train below it. Bed is heavy box section machined like other elements to be dead square so assembly of mating faces will not cause distortion.
- **"Half doors" may be used on 1957 passenger cars.** The tooling is on order, but may not be ready in time. A half door is a steel door up the belt line, with aluminum extrusions to complete the structure.
- **1958 may see the end of American Motors as a large-car producer** (money-losing Nash and Hudson lines out, output confined to AMC's best-selling Rambler, plus profitable appliance production and defense work). Rambler broke even this year at 100,000 units, expects to hit 150,000 in '57. In spite of selling off $10 million worth of plant and equipment, AMC is expected to take an overall loss for this fiscal year of around $12 million.

Watch for 470 items of military equipment to be dropped from the Defense Dept's production list. Among them: .30 and .50 calibre machine guns, C-123 assault air transports, the Skysweeper anti-aircraft gun, barges and floating cranes used in harbor support operations, and railroad stock built for foreign tracks. For details see "Another Defense Cutback" p130.

- **Butt welding of cross sections up to 62 sq in** is done on a German automatic gas welding machine 24 ft long, 9 ft wide and 18 ft high, weighing 150 tons. Clamping and compression forces are generated by a hydraulic unit with a pressure of 250 atmospheres. The machine will be used to weld railroad track.
- **Automobile dies are getting so complicated** that they are virtually becoming special machines, Detroit reports. They now include cams, links, lubrication devices and even control panels. Their cost is very high, especially when an expert diemaker is put on a machine assembler's job. Their building takes so long that they often delay the tooling program of which they are a port.
- **Hungarian metalworking firms have a new "incentive" setup:** base pay stays the same and if a worker goes 10% over his quota he gets 10% more pay, but if he falls short 10% he gets docked 10%.

Square D Co may import tooling from Japan, and possibly Sweden and Germany for its new Lexington, Ky, plant, which Square D says will be the most highly automated in the electric controls industry.

- **England's Rolls-Royce may set up a gas-turbine plant in Brazil soon,** at Sao Paulo, where Rolls already has workshop for overhauling its turbines.
- **Bolivian government will buy $2 million worth of U S machine tools** and metalworking equipment to replace obsolete machines there.

Spot index to major News stories...

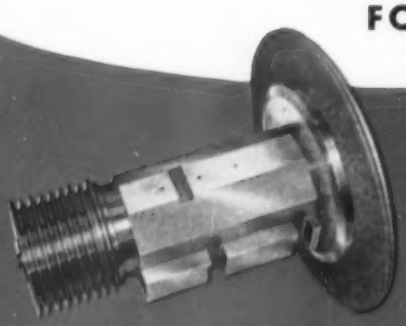
Another Defense Cutback	130	Field Report	137	Washington	75
New Life for Studebaker-Packard	131	Foreign Report	138	Detroit	77
Russian Deal for British Tools Stalls	132	Names in the News	139	Machine Tools	79
Tooling the Texas Tower	134	Surplus Machinery	215		

There's an EX-CELL-O

Precision Spindle

BUILT ESPECIALLY FOR YOUR WORK

Single-body, belt-driven internal grinding spindle.

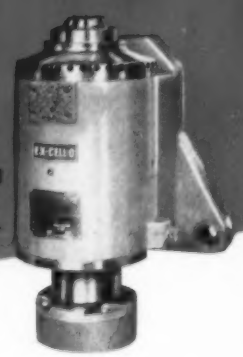


25 hp heavy duty precision spindle with 24" grinding wheel.

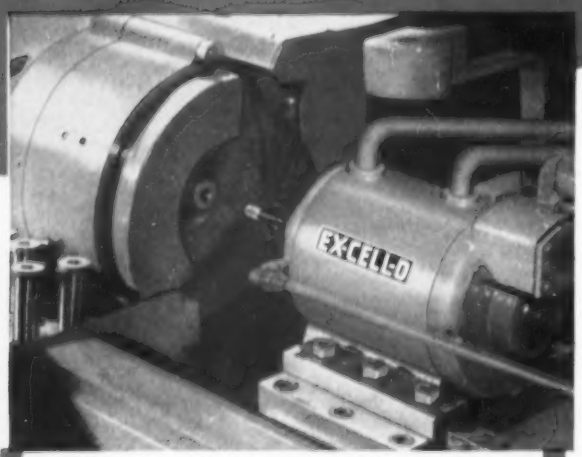
25,000 rpm high frequency inbuilt motor spindle.

Precision inbuilt motor spindle for cutter grinder.

Totally enclosed inbuilt motor surface grinder spindle.



Heavy duty motorized precision spindle available up to 20 hp.



EX-CELL-O High-frequency Spindle, rated at 40,000 rpm, grinds small holes in bushings.

XLO

EX-CELL-O for PRECISION

For production grinding to precision limits "just any spindle" won't do. It must be carefully selected to suit the work. From Ex-Cell-O's widely-varied line of precision spindles you can select a standard model, or we'll make one special to your requirements. These spindles have long been the original equipment choice of leading manufacturers.

Features of the line include:

Rigidity
Permanent adjustment
No vibration, no chatter
Precision ball bearings preloaded for predetermined speeds

Phone your Ex-Cell-O representative, or phone or write Ex-Cell-O in Detroit, for CATALOG LISTING HUNDREDS OF STANDARD GRINDING SPINDLES

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

56-32

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

Washington ... NEWS REPORT

"Pocketbook" Politics . . .

Employment, wages, profits, credit, individual income—the "pocketbook" issues—will loom big in the Presidential campaign. Democratic jibes at Republican prosperity claims make this clear.

Credit supply will be a hot issue—the Reserve Board's latest hike in discount rates points up the controversy. Democrats argue the administration has followed a policy of raising interest rates, to the benefit of big investors, at the expense of small-business borrowers.

The administration says its fiscal policies have restrained inflation, that increased costs on national debt interest payments are more than offset by what consumers save on prices.

The Democrats will work the inflation issue hard. The consumer price index went up nearly 13%, to 113.5, in Truman's last four years. Until lately, the level was fairly steady under Eisenhower, but is now around 116.2 and rising gradually.

Though both sides say taxes should come down, the squabbling is over who gained from past cuts and who will get future reductions. Democrats promise to boost personal exemptions, giving main relief to low-income voters. They call liberalized depreciation and relief from the double tax on dividends "favoritism." The Republican reply: tax incentives to business have influenced the great economic growth in the past few years, created new jobs for the increasing labor force.

Increasing profits will come under fire. The issue is whether workers' or investors' share of the rising economy has been out of proportion. The facts: under the Republicans, corporate profits have gone up 22%, income paid to labor 21%.

Row over new defense policy . . .

The upcoming cutbacks in conventional military forces are being subjected to heavy criticism (see p130). The critics—notably Army men and foreign policy experts—say increasing reliance on strategic nuclear weapons and massive retaliation leaves the U S unready to fight small local wars. A possible outbreak over Suez is cited as a case in point.

This is the major argument: The horrible prospect of nuclear retaliation makes it unlikely the H-bomb will ever be used. Thus its deterrent value is weakened. General Taylor, Army Chief of Staff, says that as a result of this "mutual deterrence," the greatest threat is now "limited aggression . . . (and that) this is the one which can be met primarily with ground forces."

The key question in this row is over what the irreducible minimum is to which ground troops and conventional arms can be slashed, as the latest pushbutton weapons get into full production.

Administration's stand . . .

Administration officials reply to such criticism this way: the new policy does not involve any elimination of ground troops. Adequate conventional forces will be kept to handle the local, police-action type of conflict. No responsible Washington official has bought the view of Air Force extremists that a future war will surely be over in 30 days.

Says a top-level Pentagon civilian official, bringing the issue down to elementals: "If you have two or so hot spots in the world requiring a division or two each, you don't use atomic weapons. If total requirements go well over four divisions, you use atomic weapons."

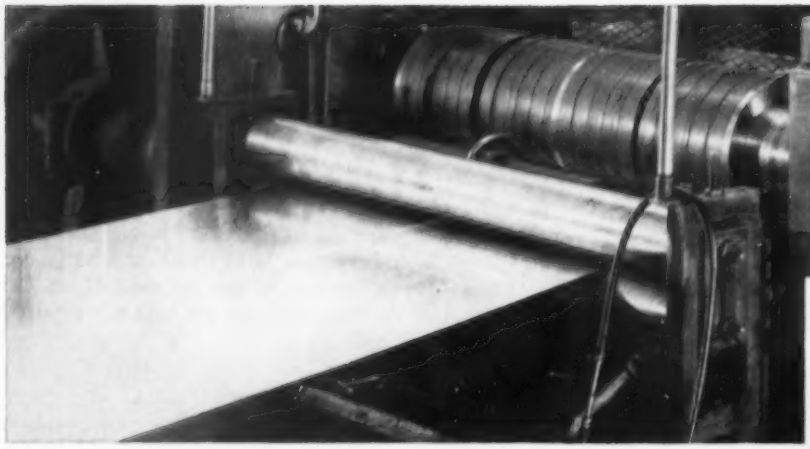
At this point, the feeling is, the distinction between tactical and strategic A-weapons blurs, the prospect is that a general war will have developed. The belief is that neither the U S nor Russia would hesitate to use the H-bomb to insure victory in a future big war.

Under current thinking, the Korean War—with 9 U S divisions on the line—is no longer considered a "small war." If any future conflict tied up as many troops, there would be no question of using atomic arms.

Future of the draft . . .

As the new manpower cutbacks shape up, one big question is the future of the draft. The law has three more years to go. Right now, the outlook is for extension beyond 1959. But unless some sort of UMT is set up to insure that all men get into uniform for at least six months or so—a Pentagon objective—it's certain that draft calls will drop to a trickle.

The statistics show why: right now, about 1.2-million men reach draft age, 18½, annually. Right off, the average is that about 22% will be physically or mentally disqualified. This leaves a manpower pool of 900,000 qualified for military service. But of this sum, an annual draft pool of 650,000 remains when you exclude 175,000 who enlist directly into the service, 60,000 who go into the National Guard or ROTC, and about 20,000 occupational or dependent exemptions. Draft calls, however, total only 136,000 this year.



First step in manufacture of automotive and industrial mufflers at Hayes Industries, Inc. Here huge sheets of USS Galvanized Steel are slit into proper widths for muffler shells. From here the muffler strips pass through forming, lock-seaming and ovaling processes.

At the same time other strips of USS Galvanized Steel are being stamped, formed and blanked into muffler heads.

Finally muffler heads are soldered to the shells and the finished product is ready for packing and shipping.

"USS Galvanized Steel

meets steep job requirements"

says Stanley Gutowski, Hayes Industries, Inc., Jackson, Michigan.

Mr. Gutowski—whose job at Hayes is Follow-Up, Production—inherits all the problems of breakdowns, rejects and production-line slow-ups. He is in an excellent position to appreciate the processing qualities of USS Galvanized Steel Sheets.

"Due to the moisture which accumulates inside of an automotive or industrial muffler, galvanized steel is used largely at Hayes Industries, Inc.," explains Mr. Gutowski, "both for the inner and outer shell and other sections of their product. This protects the muffler from rotting or rusting from the inside out as well as from the outside in. The absence of flaking and peeling of USS Galvanized Steel keeps the production line moving at a constant pace with no shutdown due to zinc clogging the presses. Ease of formability is another advantage of USS Galvanized Steel, particularly in the lockseam operation. Here again, the galvanizing stays tight, eliminating excessive rejects."

USS Galvanized Steel Sheets are continuously produced with a smooth, uniform zinc coating that adheres tightly through difficult manufacturing processes like those at Hayes.

If you, too, have a production process requiring the use of galvanized steel sheets, it will pay you to find out about the advantages of USS Galvanized Steel Sheets. Just get in touch with the nearest district sales office of United States Steel. Our experienced engineers will be glad to help you.

USS GALVANIZED STEEL SHEETS

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

UNITED STATES STEEL

Detroit ... NEWS REPORT

7.2 Million cars in '57?

Auto industry economists today are predicting sales of anywhere from 6.5-million to 7.2-million passenger cars in the 1957 calendar year.

Battling for the lion's share of that market will be those two veteran contenders, Ford and Chevrolet—with Plymouth and Buick shaping up a private war of their own for third place honors.

Ford, smarting under a resounding defeat by Chevrolet in 1956, is in grim and deadly earnest. Even though Ford people privately admit they won't whip Chevrolet hands down in '57, they expect to at least close the gap with their major-restyled 1957 models.

Chevrolet, the acknowledged champ, is noncommital about the 1957 race. With Ed Cole, who as Chevrolet's chief engineer has been largely responsible for the success of that line, at the helm of the Division the going will be rough on any company that tries to whittle down Chevvy's lead.

Plymouth will fight back hard at Buick, whose sales pitch all year has been "third place or else," and Plymouth will have Chrysler's full corporate weight behind it in the battle.

Hanging around on the fringe of the fight will be the two lonely independents—American Motors, which could well be driven completely out of the big-car field this year for lack of styling and newness—and Studebaker-Packard.

Don't look for a new Packard to come out in '57, although Curtiss-Wright and Daimler-Benz of Germany, S-P's new affiliates, may have some decided surprises up their collective sleeves for 1958. (See story on p131). S-P's new power-behind-the-throne, Curtiss-Wright's Roy Hurley, has said both the Studebaker and the Packard nameplates will stay on the road.

Those are the battle lines drawn up for 1957. Intensifying them is the fact that car prices will rise this coming year, because of increased steel prices, and payroll hikes tied to the Cost of Living Index. Latest word is that auto wholesale prices will be up 5 to 7% and, of course, the whole thing will be passed on to the customer.

One last word on the 57's: the four-door hardtop sedan will be the basic body style for many lines.

"A very odd fourth quarter indeed"...

At this moment automakers are hoping—with no little justification—that a sellers' market will be in effect as 1956 models fade from the showrooms.

Here's why: fourth quarter output, which will be all 1957 models is estimated anywhere from 1.5-million to 1.75-million cars, with autodom's top economists pegging output at 1.6 million.

Now, when you figure that in the corresponding period for the '56 model year (fourth quarter '55) the industry—all hopped up by 1955's record-breaking sales—turned out just short of 2-million cars, this year's production represents a 17% slash, now characterized by the auto industry as "a more realistic approach to existing markets."

Again, figuring the public just wouldn't go for the "too little change" '56 cars and that by all the laws of supply and demand it must be holding out until the 1957s hit the salesrooms, you get the basis for the industry's hopes that the coming model year will be launched on a roaring sellers' market that could run well into next summer's doldrums at a breakneck pace.

Farewell to the '56s . . .

"A sobering calendar year" is just about the kindest term the industry can dream up for 1956.

When the figures are all in, it's estimated that some 6.5-million passenger cars will have been turned out in the U S this year, plus slightly more than a million trucks. While this figure is somewhat higher than the recent revised-downward estimate of 5.8-million cars, it stacks up pretty sadly alongside 1955's 7.9-million passenger car production.

Conversely though, it looks pretty good by comparison with 1954's 5.5 million. Lined up alongside 1953's 6.1 million, 1956 is a so-so year.

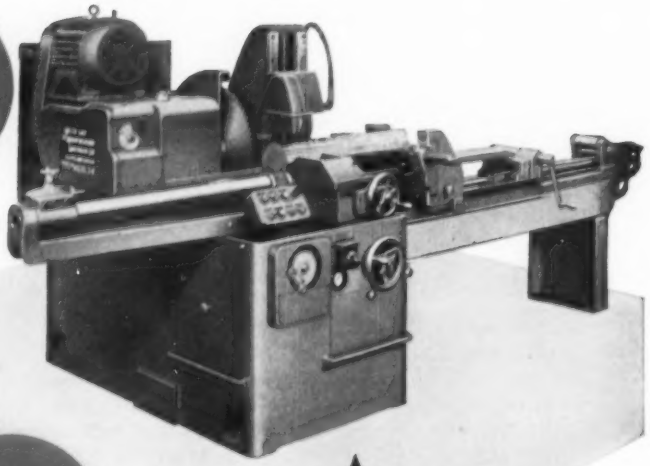
But truck output has been steady since 1952—ranging anywhere from 1 million to 1.25 million. Actually, U S truck output has varied little, all things considered, since 1947.

Although signing of the Federal Highway Bill should increase production of extremely heavy (15,000 GVW) trucks, this will probably be more than offset by the sacrifice of some light-truck output to the growing market for station wagons.

One cheering note out of unlamented 1956: Ford's Thunderbird is still in short supply—running four weeks behind orders for the first six months of calendar 1956. So far, the T-Bird has racked up a total production of 12,904 units for the '56 model year, 9853 cars for the calendar year so far. Compared to Chevvy's Corvette, it's Ford's one consolation in its battle for top sales honors.

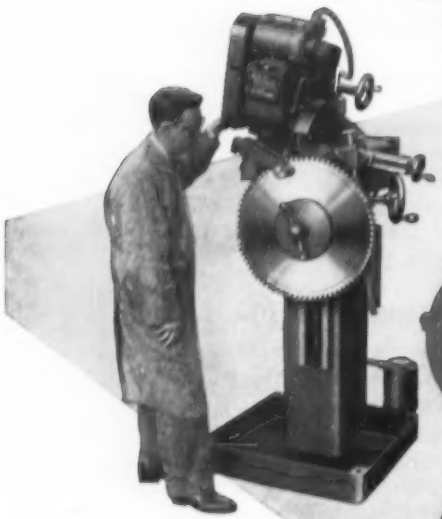
THE Triple-Chip METHOD IS A *Triple-threat* TO HIGH CUTTING COSTS

CIRCULAR SAWING MACHINES



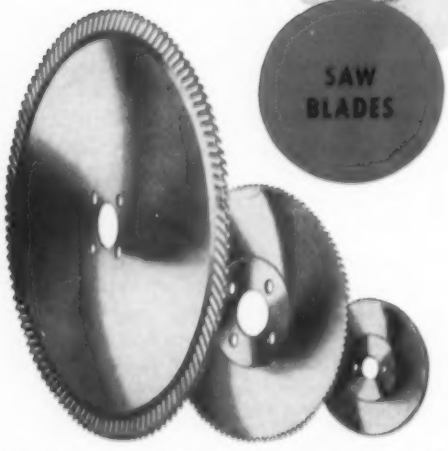
The No. 2-8 machine for cutting off solid metal up to 8" square.

SAW BLADE SHARPENERS



The G-45 sharpener for blades 8" through 48" diameter.

SAW BLADES



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to *your* cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. *Just such a study of your job is yours for the asking.* We offer you an unmatched experience in the sawing of any machinable metal, round, square or structural shapes, from 1/4" through 43" diameter.

THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

Machine tools ... NEWS REPORT

Big orders expected from Detroit . . .

There is plenty of reason to believe that the automobile industry will be a big buyer of machine tools in the final four months of this year.

Whether orders from Detroit will measure up in dollar volume to the plush business placed in the similar months of '55 remains to be seen. Even if they should not, they still will fill many a machine tool builder's shop with work.

Much of the business will be tooling for 1958 models. A certain portion of it, however, will be concerned with production expansion programs.

Both Ford and Chrysler are going in heavily for making more of their own parts rather than getting them outside. They plan to spend millions to equip new plants for this purpose.

Chrysler already has put out some sizable orders for machines for a new plant in northeastern Ohio.

Machine tool outlook favorable . . .

Machine tool builders regard the outlook in the months ahead as highly favorable. E C Bullard, president of the Bullard Co, expresses an opinion that is shared by many others when he says that "new inquiries point to a continuation of strong customer demand" and that "it is expected that there will be an increasing volume of orders in the fall."

The impression is growing that production of machine tools will stay at or very close to the present level during the next 10 to 12 months.

The industry's backlog is well over 8 months. With business flowing in at even a somewhat slower pace than the average for the year to date, shipments should stay up high through the final quarter of 1956 and the first half of 1957.

The pile-up of orders is greater among makers of special machines than among builders of general-purpose machines. One prominent maker of specials reports his backlog as steady at 15 months, despite recent boosts in shop capacity. Some general-purpose tool builders, by contrast, have 5-7 months of business.

Pentagon to push modernization . . .

Department of Defense intends to give more than lip service to the much-touted program for modernization of the machine tool holdings of the armed services.

A decree from the Secretary's office is now in the works that will make it impossible for any of the three branches to crawl out of the program.

Each of the services will be expected to spend a minimum of around 3% of the cost of its machine tools and a maximum of about 5% each year for replacement of existing equipment with new.

What's more, rules are to be posted that will prevent a service branch from appropriating money for machine tool replacements and later, when no one is looking, diverting it to something else.

Only trouble is that the entire program for keeping the armed services' machine tools up-to-date came into being too late to be put into effect in fiscal 1957 ending June 30, 1957. Defense Department budget had already been made up and submitted on The Hill.

First effects of the program thus won't be felt until fiscal 1958, the military budget for which will be sent up to Congress next spring.

This means that no machine tool orders for the program will be placed before the second half of 1957. It also means that machine tool business from the services will be pretty slim pickings throughout the current fiscal year.

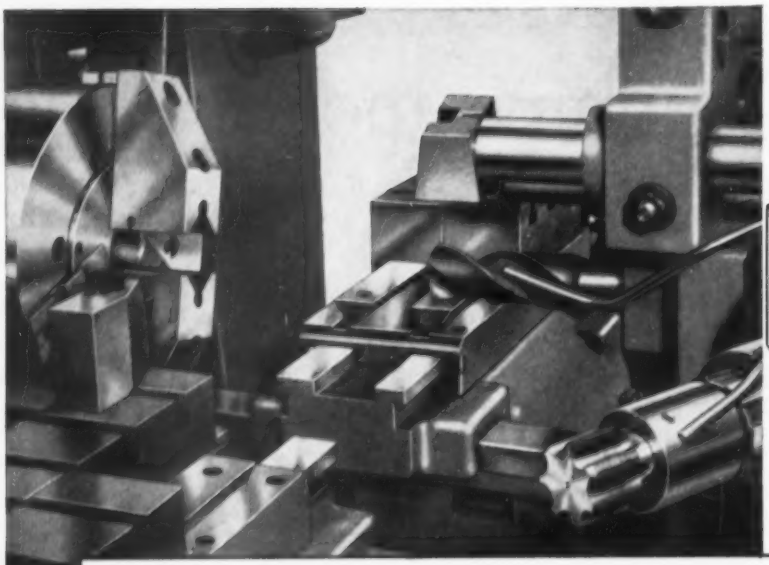
Big order for lathes . . .

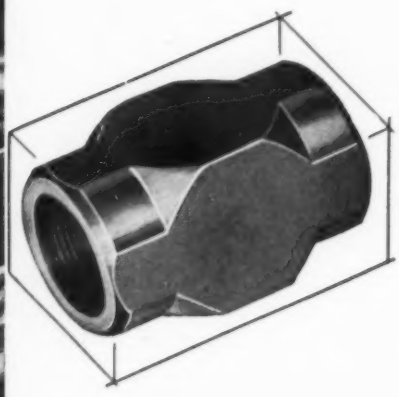
The only recent machine tool business from the government that has caused a stir was for some 250 engine lathes for the Navy.

The bulk of this business, for which bids had been taken, went to a Cincinnati company. The order just got under the wire before the end of the 1956 fiscal year. The fears of some machine tool people that some of the machines might be bought abroad proved ill-founded.

Moscow has not yet negotiated for purchase of any British machine tools on the Krushchev shopping list so ostentatiously left in London after the visit of the Soviet bigwigs.

Russian technical teams have gathered all sorts of literature about British machines, have visited British plants, but that is all. Action has got bogged down in international politics, including the Suez crisis. For full story, turn to p 132.





From STAINLESS to STEAM TRAP

machined FROM THE SOLID in just 6.90 minutes

on a P&J 4-U Automatic Chucking Turret Lathe with POTTER & JOHNSTON ENGINEERED TOOLING

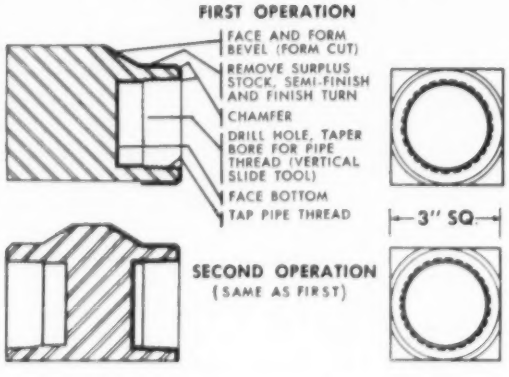
HERE ARE THE JOB FACTS:

PART NAME: Steam Trap Body

MATERIAL: 3" Stainless Steel Cut-Off Stock

MACHINING: 2 Completely Automatic Cycles, 11 Cuts, Each including a Taper Bore and Tapping a Pipe Thread

FLOOR-TO-FLOOR TIME: Only 3.45 Minutes per Cycle; A Completed Piece Every 6.90 Minutes!



HEAVY LINES INDICATE MACHINED SURFACES

But you can't tackle jobs like this *profitably* on machines built for yesterday's easy-going standards. Handling complex cuts and heavy metal removal on tough modern alloys with a speed, economy and accuracy that can meet *today's* (AND tomorrow's) highly competitive standards takes a P&J 4-U Automatic. Here is the advanced design, added rigidity, extra speed and power needed to take full advantage of faster cutting carbide tooling . . . to turn problems into profits!

TAKE ADVANTAGE OF P&J DIRECT-FACTORY SERVICE

To serve you best, all P&J Automatics are made available to you through Potter & Johnston and Pratt & Whitney direct-factory Representatives. For full information on 4-U and other advanced-design P&J Automatics . . . and for expert application and tooling engineering . . . phone or write the P&W Branch Office conveniently near you. There is no obligation for this technical service.

Precision Production Tooling for more than Fifty Years

POTTER & JOHNSTON COMPANY

PAWTUCKET, RHODE ISLAND

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INCORPORATED

MODERNIZE WITH POTTER & JOHNSTON . . . REPLACE FOR PROFIT

15 FT. One-piece Plastic Boat Hulls made possible . . . by KELLERING

The PRATT & WHITNEY BG-22 KELLER

AUTOMATIC TRACER-CONTROLLED MILLING MACHINE . . . cuts another BIG job down to size. The R. H. Freitag Mfg. Co. of Akron, Ohio provided the Molded Fiber Glass Body Co., Ashtabula, Ohio with molds to be used in producing about 300 fifteen-foot fiberglass motorboat hulls a month. The male mold was duplicated from a wood model and the female from a fiberglass model, on Freitag's 16' x 7' Keller BG-22 Machine.

Standard-size Type BG-22 Keller Machines have work size capacities of 10' x 5', 12' x 6' and 14' x 7'. Machines with special combinations of travels required to do specific jobs can be built on order.

Whatever the size — big or small — or shape — simple or complex — of the plastic parts you want, a Keller Machine can provide the capacity and ability to produce accurately, quickly, economically the dies and molds you need.

P & W Keller Machines are designed and built specifically for tracer-controlled milling and can handle a wide variety of jobs without major adaptation by expensive attachments.

MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

Write now on your Company letterhead for more detailed information. Request your free copy of —
Circular No. 537 on Type BG-22 (for large molds)
Circular No. 565 on Type BG-21 (for medium size molds)
Circular No. 490-3 on Type BL (for small molds)

PRATT & WHITNEY COMPANY
INCORPORATED
11 CHARTER OAK BLVD., WEST HARTFORD 1, CONN.

BRANCH OFFICES . . . BIRMINGHAM • BOSTON • CHICAGO
CINCINNATI • CLEVELAND • DALLAS (Southwest Industrial Sales Co.)
DETROIT • HOUSTON (Tri-Tex Machine & Tool Co.) • LOS ANGELES
NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER
SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

FIRST CHOICE FOR ACCURACY SINCE 1860

MACHINE TOOLS • CUTTING TOOLS • GAGES

FACTS

about

NEW DEPARTURE

BALL BEARINGS

EXPERIENCE...

FOUNDATION OF OUTSTANDING QUALITY

● In manufacturing highly specialized precision products, such as New Departure ball bearings, there is no short cut to the knowledge and skill gained by long experience. The superiority of the methods, materials and the products resulting from New Departure's sixty years of manufacturing experience is recognized wherever precision ball bearings are used.

BALL BEARINGS MAKE GOOD MACHINES BETTER

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

What's ahead ... in Metalworking

NEWS REPORT

"Four months of good solid business ahead" ...

Metalworking is heading into four months of good solid business—September through December. Operations will pick up momentum as the fall season approaches. And the fourth quarter should be a rip-snorter.

High production is not expected to end as the new year approaches. It will carry over well into 1957. A few soft spots continue to show up, principally in the farm equipment and tractor industry, where a number of plants will be shut down for some weeks in order to bring output back into balance with sales.

The automobile industry is another weak spot, but the fourth quarter should see Detroit's car manufacture rolling along with a lot of horsepower.

Production of capital goods bowls along without any hint of slackening. Machine tool and material handling equipment backlogs are as big as ever, or perhaps bigger.

What's happening in resistance welding equipment shows the strength in capital goods. New orders this year have run 54% ahead of last year, while production is up 34%. The present high level of business probably will continue at least into early 1957.

Construction machinery people are doing very well. Remainder of this year will be as good as 1955 or better.

Heavy electrical machinery is setting new records, with output limited only by plant capacity.

The same is true of electric motors. One maker of electrical industrial goods, whose situation is about the same as others, has a pile-up of orders that will keep him busy into next year. His shipments are barely keeping pace with orders, which are coming "from all over the lot."

Aviation parts companies report a complete reversal of the year-ago trend toward slackness. Now they are booming or are on the verge of it.

Typical reports: "Will be busy for the next six months, and current orders and inquiries are very good"; "capacity output is assured well into next year," "1957 looks like our banner year, except for 2 or 3 war years."

Auto parts makers say that both the second and third quarters were about 20% below the first quarter, but the final quarter should be back up to the January-March total.

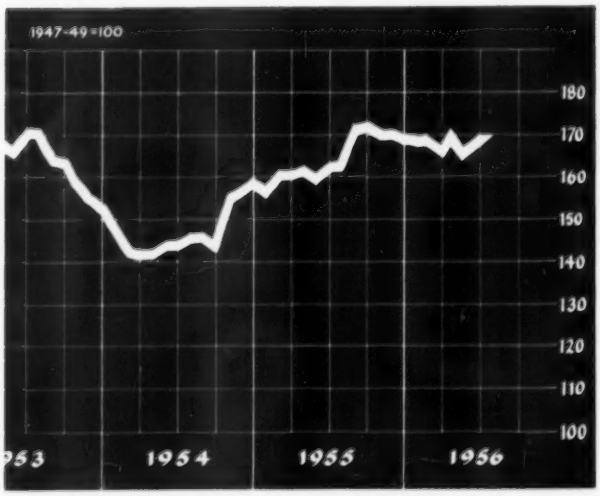
Fourth quarter releases have just barely started to come through. This fact has not been displeasing to some auto parts companies who have used the time to figure increased costs and translate them into increased prices for their products.

There is no famine in fabricating types of steel except in a few items, despite the fact that mill books are loaded with orders.

Even when Detroit gives the green production light, enough steel seems assured.

Delivery of plate and structurals is likely to be relatively slow for a long time. There was plenty of sheet and strip in warehouses at the end of the strike.

Steel mills are hitting prestrike production just about now.



AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

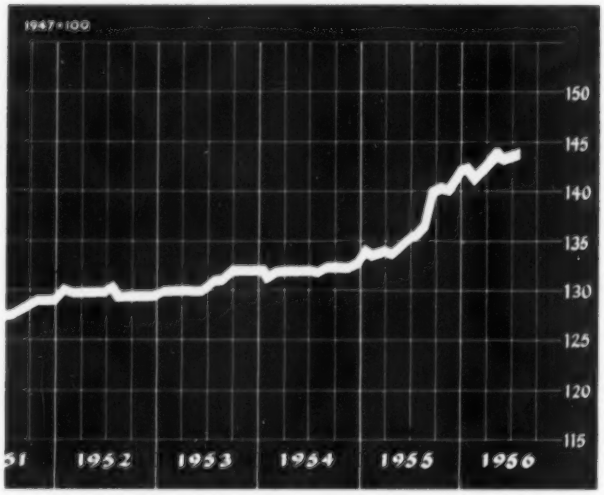
	AUGUST Estimated	JULY Preliminary	JUNE Revised	JULY Year Ago
Total Index	**171**	**171**	**168**	**167**
Machinery	151	149	138	
Electrical Machinery	212	205	197	
Autos	110	110	147	
Other Transportation	333	333	298	
Other Metalworking	141	138	138	

NEWS REPORT

What's ahead . . . in Business

AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	AUGUST Estimated	JULY Preliminary	JUNE Revised	JULY Year Ago
Total Index	**144.5**	**144.2**	**144.0**	**135.8**
Metalworking Machinery		165.8	165.8	155.4
Other Machinery exc. Electrical		151.4	150.9	140.3
Electrical Machinery		143.2	143.2	131.9
Fabricated Metal Products		137.5	137.5	131.5



Output is going up, but so are prices . . .

Industrial production has rebounded from the dip during the steel strike. It promises to be back up where it was before the strike, or around 141 on the Federal Reserve Index (on adjusted basis). Chances are that the manufacturing industries in general will give a good account of themselves the remainder of the year.

The fourth quarter in particular looks good. The nation's output of goods and services probably will rise to a new peak then. Second quarter of 1956, latest period for which figures are available, now holds the record—a Gross National Product of $408 billion.

Prices are getting plenty of attention from all industries. The price hike in steel gave impetus to an upward movement already in motion.

Number of household appliance people have announced higher prices for new models. Television, radio and air conditioning units are among the items that will carry stiffer price tags.

Prices have been raised recently on many industrial products, including industrial machinery and machine tools. And the end of price increases is not in sight.

The truth is that industrial prices have been going up at a gentle rate since late 1954. They have been pushed up one-half percent a month since June 1955. Fortunately they were offset until recently by a decline in other prices, notably food and farm products.

American Machinist Metalworking Price Index (top of page) stands at 144.5, against 135.1 in June of last year. That is not a big gain, but still is significant because it has been steady.

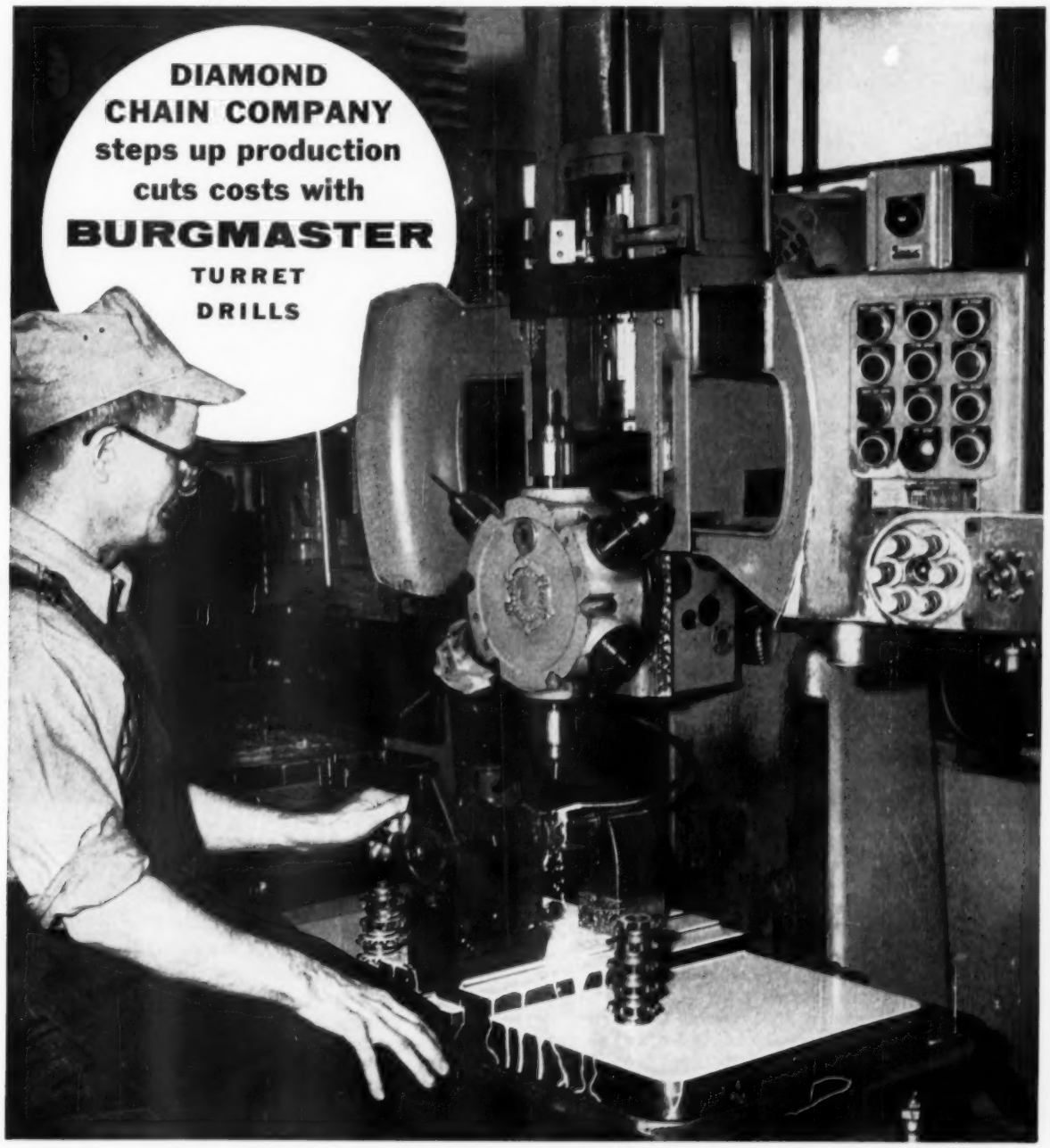
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949=100)*	144.5	143.0	142.1
Steel ingot operation (thousands of tons)	2,106	1,415	2,176
Electric power output (million Kilowatt hours)	11,530	11,190	10,925
Production of automobiles and trucks	134,612	140,989	175,822
Engineering construction awards (Eng. News-Record—millions)	$258.1	$322.8	$322.2

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949=100)*	136	141	139
Index of durable manufacturers' production (1947-1949=100)*	149	157	155
Durable goods manufacturers' sales, millions*	$13,879	$13,754	$13,527
Machinery manufacturers' sales, millions*	$ 3,960	$ 3,935	$ 3,547
Durable goods manufacturers' new orders, millions	$14,365	$14,732	$14,033
Machinery manufacturers' new orders, millions	$ 4,250	$ 4,460	$ 3,734

* Seasonally adjusted.



"THE BURGMASTER automatic hydraulic turret drill at The Diamond Chain Company plant has proven very satisfactory. The ease of selecting and setting the available wide range of speeds, feeds and stroke length of each turret spindle makes the machine very adaptable for center drilling, countersinking, drilling and tapping set-screw holes in steel sprocket hubs. Tool breakage has been reduced through the use of Burg tool holders, tapping heads and the adjustable hydraulic feeding pressure."

This experience is far from unique. If you are not now experiencing the improved quality of work and production savings possible with the BURGMASTER, *write now for descriptive literature covering all models.*

For complete information, write Dept.

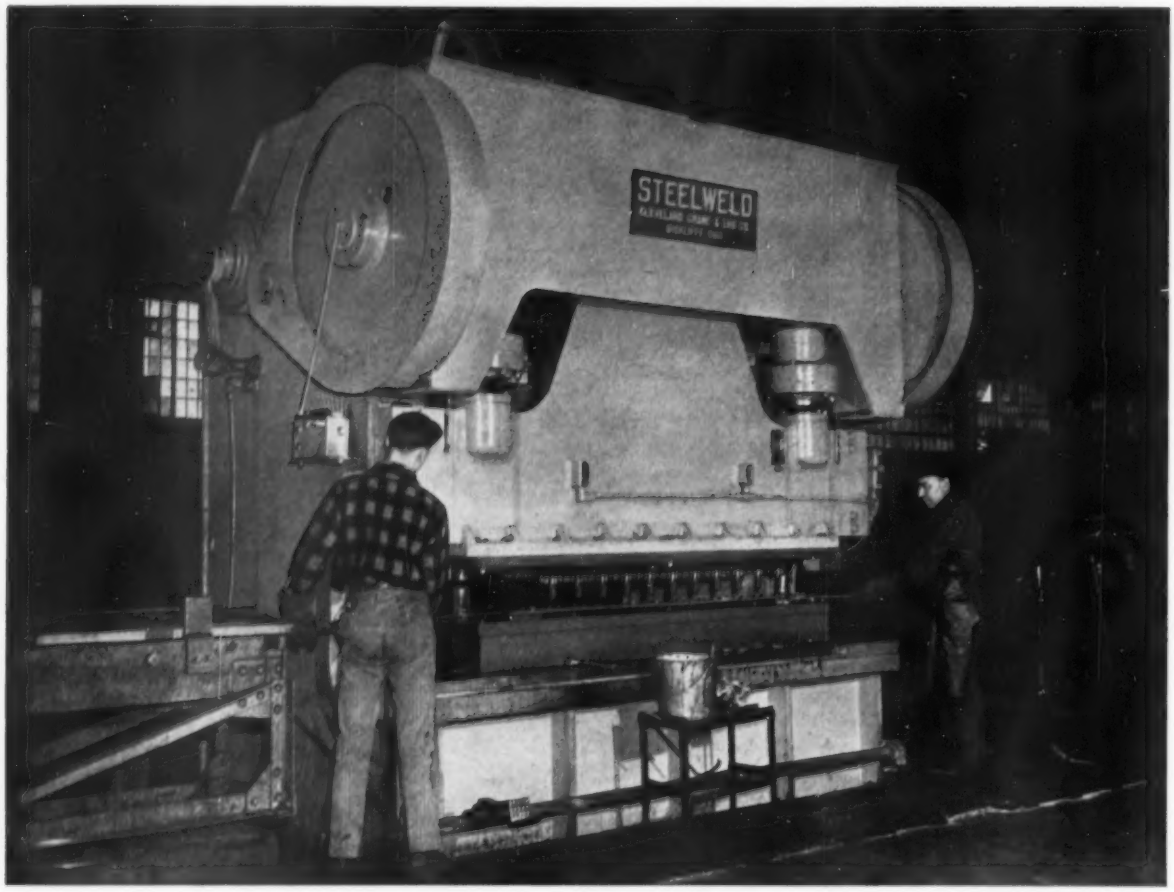
BURG TOOL
Manufacturing Company, Inc.
15001 S. Figueroa St., Gardena, Calif.

Sales Offices:

RIDGEWOOD, N.J.: Burgmaster Eastern Sales Div., 86 N. Maple Ave., GIlbert 4-3002

CHICAGO: Burgmaster Machinery Co. 5329 Lincoln Ave., UPtown 8-7161

SAN FRANCISCO BAY AREA: Paul A. Kulju 857 Estabrook Street, San Leandro, Calif. LOckhaven 9-2244



Model K5-8 Press, one of two Steelwelds in continuous 24-hour service since 1945, punching a series of holes in bridge floor bars.

2,000 Bars slotted every 8-Hour shift

Although originally conceived as machines for bending metal, Steelweld Presses are now serving a wide variety of uses. Two large Steelwelds at the MacDonald, Ohio Plant of the Carnegie-Illinois Steel Corporation are used solely for punching slots in steel bars, beams and T-sections for bridge flooring.

The time of one press is devoted largely to punching slots in bars 1⅝" and 1-7/16" wide by ¼" thick by 6'-2" long. Each bar contains 13 slots ½" wide by ⅝" to ⅞" long, and 24 slots ¼" wide by ⅝" to ⅞" long, a total of 37 slots all punched at one time. Two thousand bars are slotted in an eight hour shift.

Another standard job is that of punching 2-inch long slots on 4-inch centers in I-beams for bridge sections. These are punched 24 at a time. The beams vary in length from 24'-0" to 45'-0". Two hundred 40'-0" beams are punched in an 8-hour period.

Both Steelweld Presses have been in this service 24 hours a day since 1945.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO

1432 EAST 281st STREET, WICKLIFFE, OHIO

STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

American Machinist

MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

Keep the contest one-sided

The Russians apparently have given up hope that all they have to do to take over the western world is to wait for the catastrophic collapse of our economy.

Just why they nurtured such a hope is a mystery. For the fact is that they have been busy for years imitating us.

They have wrapped their own activities around a series of Five-Year Plans, the ultimate objective of which is to catch up with us. They have worshipped at the feet of productivity. They have established the equivalent of a Ministry of Automation.

They are absorbed . . .

in expansion of their own machine tool building industry. They wish to import large numbers of machine tools. All of which is part and parcel of a program of mechanization that attempts to outdo us.

This imitative characteristic should not be surprising. Because no matter what one thinks of the Russians, they cannot be called stupid. They are very perceptive people, with an ambition to go places. And what do they see over here?

The answer is an ever-rising standard of material living resulting from providing each worker with more and more horsepower. The explanation for this constant upward movement is given in a recent publication of the Machinery and Allied Products Institute entitled "Trends in Equipping the American Worker."

The average factory worker . . .

in our country can buy 70% more with a week's wages today than at the beginning of World War II. He can purchase twice as much as in 1930. Measured in an hour's work, he had to pay in 1948 half of what he did in 1914 for a pound of bacon, two-thirds for a loaf of bread, one-half for a suit, one-third for an automobile. And since 1948 the ratio has become even more favorable.

Why is this so? Because industry has invested so generously in new equipment over the years that today's factory employee has the capacity of two men of the 1920's, four men of the 1890's, and eight of the Civil War period. Each generation the productive ability of each employee doubles, thanks to the new and constantly improved machines.

This amazing increase in productive power per employee has come directly from industry's overall investment in him of $12,500—in plant, equipment, land and natural resources, working capital. About three-fourths of the outlay for plant and equipment has been for equipment.

Rapid technological changes . . .

widely prevalent in Metalworking, call for increased outlays for new plant and equipment. They add to the investment per worker.

These are the things in our economy that the Russians see and admire. Our fabulous success inspires them to try to catch up with us and if possible eventually outdo us.

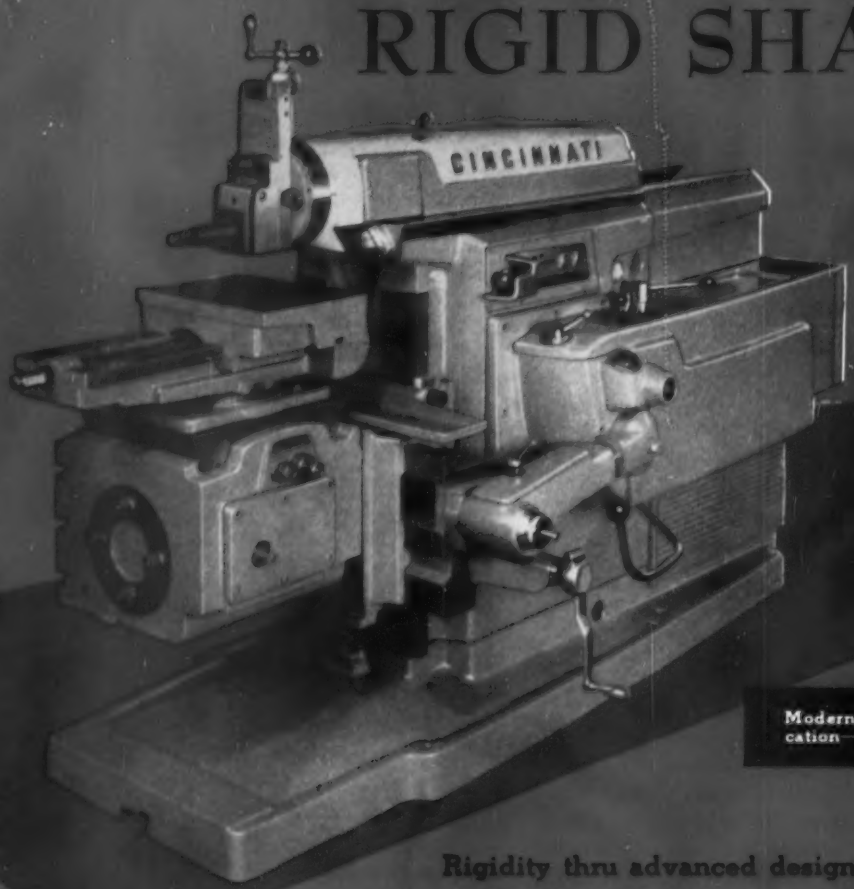
The contest at first glance seems one-sided. But it can only continue one-sided as long as American management recognizes that its own selfish interests as well as the national good are at stake in setting aside sufficient funds on a regularized yearly basis to mechanize further its production processes and not allow its manufacturing methods to stagnate.

Only by means of such regularized investment do we achieve low production costs, high productivity, increased purchasing power and an economic prosperity that is the envy of everyone else, including the Russians.

Burnham Finney EDITOR

Modern nodular iron slot-free ram for greater accuracy.

CINCINNATI RIGID SHAPERS



Modern 50 PSI pressure lubrication—positive, safe, efficient.

Modern brushless electro-magnetic brake and clutch—no adjustment required.

Rigidity thru advanced design of column, ram, vise and trunnion permits smooth heavy cuts on these modern Cincinnati Rigid Shapers.

The most modern controls and oiling system give speedy performance and easy and positive operator control.

Furnished in 16″ to 36″ capacities.

WRITE FOR THE NEW DESCRIPTIVE BULLETIN.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

American Machinist

EXACT PLASTER MODEL of the C-130 nose section was first step in making the master gage. Window locations and holes to be drilled were marked and checked

- **C-130 Hercules has 20 panels in the nose, 23 windows**
- **Some fits are ± 0.007 in.**
- **Over-all tolerance is about 0.030 in.**
- **Rapid production of master gages was essential, so . . .**

Now gages are made of plastic

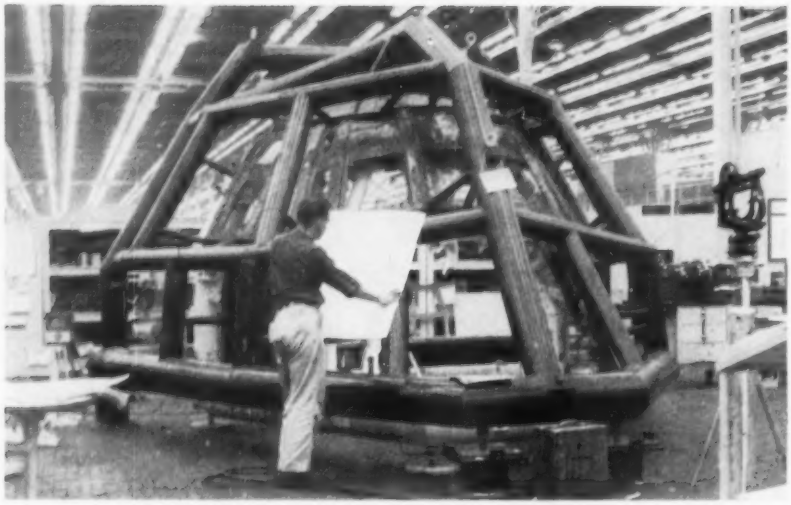
ROBERT E GRIFFITH, foreman, Plastic Tooling Dept, LOCKHEED AVIATION CORP, MARIETTA, GA

Accurate gaging and checking of each part and every stage of assembly is vital in airframe production. For the Hercules, now manufactured for the Air Force, the Tooling Department at Lockheed-Marietta built some 23 sectional gages and one master gage to check the entire nose.

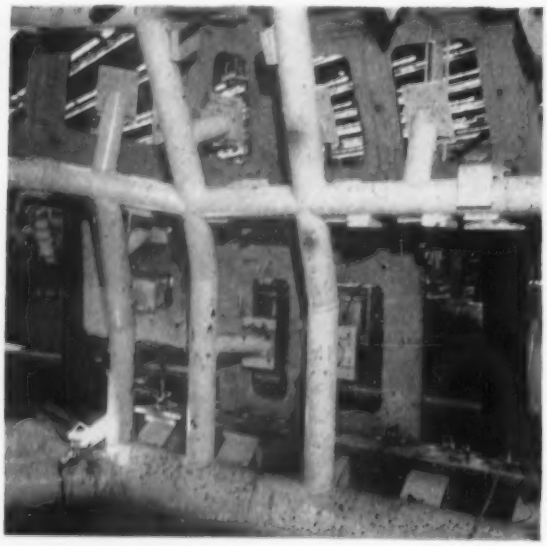
Because delivery schedules for the Hercules were urgent, we decided to make this master control gage out of plastic. Past experience had shown that, compared to conventional methods of Kellering or otherwise hand-machining metal gages, making them out of plastic generally meant a time saving of at least 30% and sometimes as much as 60%.

However, to be of value in gaging applications, the plastic, once cured, must be absolutely stable under normal conditions. If it absorbs moisture and swells, if it shrinks or expands with temperature changes, or if it warps or changes shape with age, it will never be a reliable gaging material.

Considering all these requirements, we have found that of all the types of plastics currently available, the epoxy resins are the most suitable. They are not affected by atmospheric changes



PIPE FRAMEWORK FABRICATED IN ADVANCE was pushed into epoxy gage before curing so supporting pipes butted into the gage



INSIDE THE NOSE GAGE while an assembly jig is being fabricated to the standard of the master gage

FROM THIS PLASTER MASTER, and the splash taken from it, the forming die, routing and drilling fixture and a master checking gage will all be fashioned

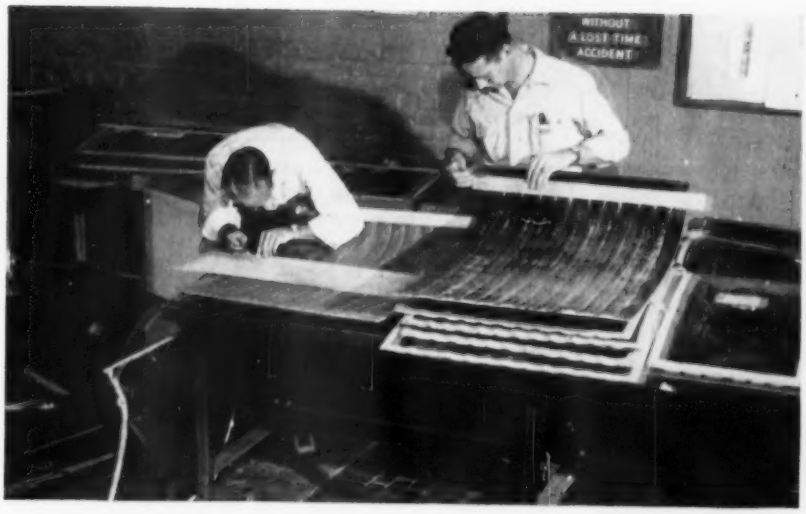
and, equally important, they do not shrink from pattern or mold dimensions to any appreciable extent. The size and shape of the master will be reproduced exactly in the epoxy duplicate, and will stay the same indefinitely.

HOW GAGE WAS BUILT

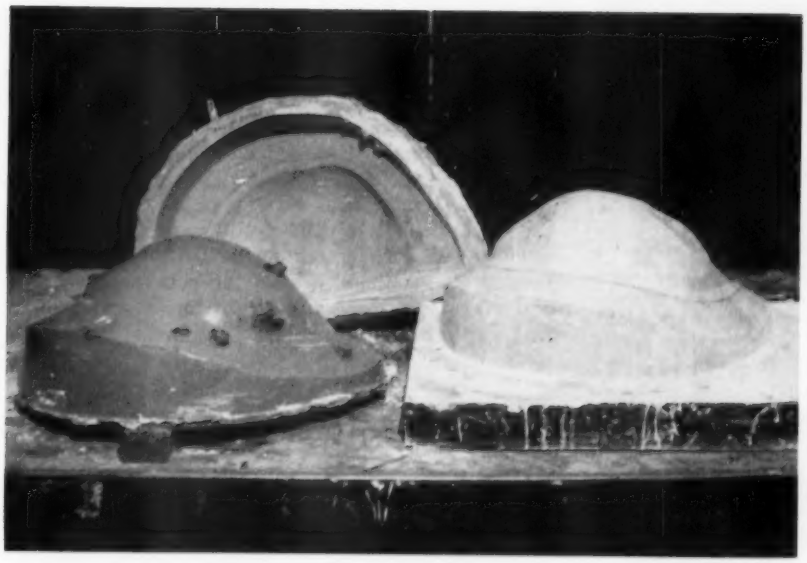
First step was to build a model of the nose section in plaster. Dimensions were repeatedly measured with optical instruments, other methods being too unwieldy for this giant plaster master. While the plaster was being finished to specifications, the welding shop fabricated a frame of steel pipe which would later hold the plastic gage.

With these two preparatory steps completed, construction of the actual gage began. To begin with, the plaster was protected with a parting agent, and a brush coat of epoxy formulation was applied. Next a layer of type 181 glass cloth was draped over the plaster, and again a coat of the epoxy resin was applied. These two steps were repeated until the build-up of the reinforced plastic was about ½ in. thick. Before the last layers of glass and epoxy were applied, the steel framework was positioned so the supporting steel pipes butted into the laminate. No other fastening between frame and laminate was required to make it a simple, rigid unit. The assembly was allowed to cure at room temperature overnight.

Individual master gages for all the windows,



TRIMMING AND DRILLING JIGS made from epoxy molded to splashes. Each is for a different wing skin—92 such jigs are required for the Hercules outer wing



THREE STEPS IN BUILDING A DIE: plaster mold (right), plaster splash taken from it (in rear), and epoxy-faced die cast from the splash (left). Small dams of clay on finished die were used to contain epoxy formulation added to fill pin holes caused by spacers in molding

fabricated in the meantime, were then positioned on the laminated epoxy shell by coordinating holes picked up from the plaster model, and assembly holes were cut or drilled into each gage for precise mounting.

Although the most impressive new application for epoxies, the nose-checking gage is by no means the only one. Lockheed has been using Shell Epon resin-based formulations for about two years for a variety of tooling uses. Among them are drop-hammer dies, lay-up blocks, stretch-press dies, hydraulic-press dies, and drilling and routing fixtures.

When we first got started in plastic tooling, we used phenolic resins over a wooden "egg-crate" base. The dies worked quite well, but storage outdoors would always cause weathering of the wooden base and/or cracking of the plastic surface. Also, because phenolics are quite brittle, it was imperative that the wooden sub-structure fit the plastic facing perfectly, or the pressure exerted by the press would crack any unsupported die area. Epoxy-resin-based formulations and our newer methods of plastic-die construction have overcome these difficulties entirely.

The main reason why plastic dies are so much cheaper than metal dies—savings on some dies are as much as 60%—is that the plastic dies are cast against an inverted pattern of the part we wish to form. Costly hand barbering is eliminated and the only machining involved is drilling and tapping the

Now gages are made of plastic . . .

STRETCH-PRESS DIE was made of low-melting alloy faced with epoxy to match plaster splash in foreground. Splash was molded directly from B-47 mock-up. Formed and trimmed sheet is lying on the splash

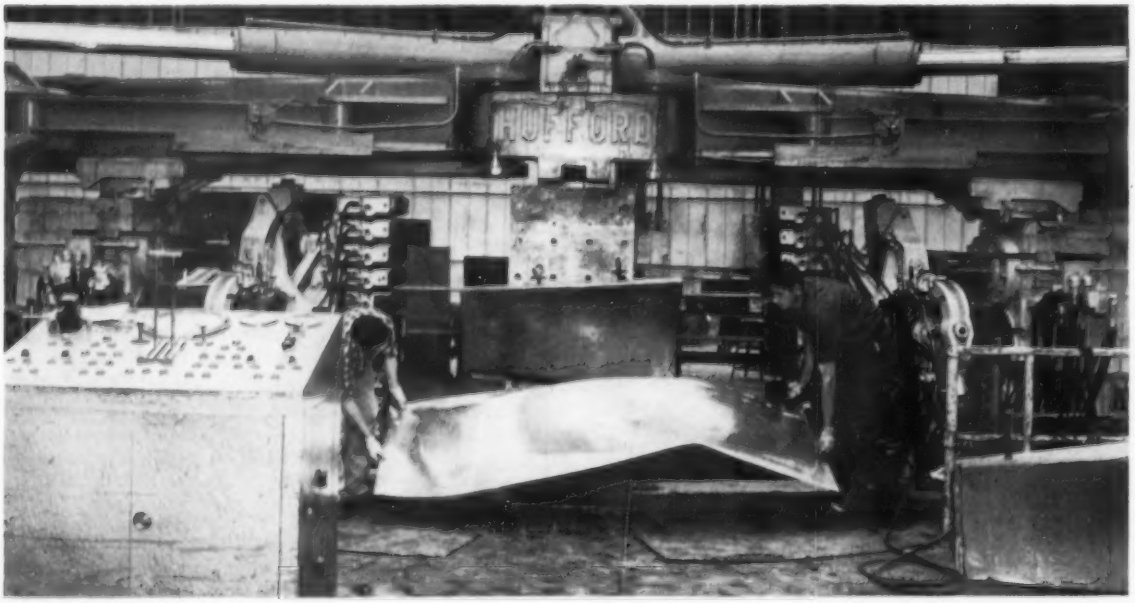
metal core so that the entire die may be lifted and transported.

Our method of producing plastic dies is: Starting with a model of a particular stamping, we first prepare a plastic follow-board or splash which, in effect, is an inverted pattern. After this splash is covered with caulking compound, ¼ to ½ in. thick to dummy the thickness of the epoxy facing applied later, a plaster casting pattern is prepared and a metal core cast from it.

While the core is hardening and cooling enough to be removed from the casting sand, the female splash is cleaned, carefully smoothed, and waxed. Cast epoxy spacer plugs are inserted into place, and the metal core is repositioned. Epon formulation is then poured into the cavity between the splash and the core, and allowed to cure at room temperature for at least 7 hr. Although a post-cure of 4 to 5 hr at 125 F is recommended, we omit this step when pressed for time.

The formulation depends primarily on the uses for which the die is intended, but there are three which we use most frequently. For most applications where temperatures will not exceed 200 F, we use Kish No. 341 resin. If higher temperatures are likely, up to about 400 F, the No. 412 formulation works out best. And when we need a certain amount of resilience in drop-hammer dies, we depend on a 50-50 blend of No. 247 resin and No. 358 catalyst.

There are 92 skins in the wing of the C-130 turboprop transport, each slightly different from all the others. A die and a trimming and drilling fixture are needed for each skin. These, the checking fixtures, and other accessories can all be fabricated from a single splash for each skin.



WING FILLET of 0.040-in. clad aluminum is removed from stretch press after forming over epoxy die with 50,000-lb pull

We learned about nylon by trying

"We're experimenters . . . and we try out as many ideas and methods as we can, to see what we can gain." After many trials and off-beat experiments, Friden *has* gained—with four principal ideas:

- **Special, economical dies**
- **Standards on shrinkage**
- **Color codes with household dyes**
- **Normalizing to relieve stresses**

TWO-SHOT INJECTION DIE FOR MULTIPLIER-DIAL SEGMENT that goes into business machine is half steel, half Kirksite (lower part is Kirksite). Double injection produces light-colored numerals on dark-nylon background for permanent visibility on the part. Clamp lever is for releasing lower die so it can be pulled part way out of press on slide, which simplifies unloading

Friden started out with nylon some time ago because of a laminated-phenolic gear that kept breaking under stress. Nylon cured the breakage problem and worked out handily in that application. Since then, the material has been spreading to other parts for business machines. Molded gears, shaft clips, transfer guide bars, and many other parts are being made.

Nylon is also machined from solid to make bushings and bearings that are outstandingly successful.

Fundamentally, it's a good material. Those who have had trouble with it are most likely trying poor applications, or perhaps not using the right formulation for the jobs at hand. Under the general heading of "nylon" there are many formulations, all with slight differences.

Friden uses FM 101, a molding powder with high fluidity at molding temperature and good machining qualities. It has 15,000-psi tensile strength, 13,000-psi flexural strength at 70 F, and flows at 480 F. It molds easily into thin and irregular sections, and has high resistance to acids, oils, greases, and solvents.

EXPERIMENTAL CAVITIES

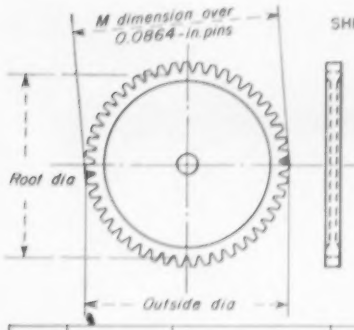
But nylon shrinks in the mold as it sets, and this is an important problem when parts are supposed to be made to fair precision standards. Nylon parts at Friden average about 0.01-in. shrinkage, but this varies from 0.005 in. on a thumbnail-size part to as much as 0.125 in. on a part 6½ in. long.

One answer to the shrinkage problem is to make close-dimension trial molds before the part is put into production. A trial mold can be used to make test parts that can be measured. Then the mold can be corrected or replaced, until finally the piece comes out right. Then the production mold can be built with reasonable assurance that production parts will be accurate enough. Accompanying charts show dimensional deviations measured on a nylon gear.

DIE SHORTCUTS

Kirksite dies are now standard for short-run nylon parts. It used to take as long as six weeks to get beryllium-copper die members made at a Midwest shop, and costs were high. Now, Kirksite is hubbed in a laboratory press, where an automobile jack provides the power. A brass hub is bolted to the press base, and the Kirksite block is forced against it.

Among a number of eutectic materials tested, Kirksite was the



SHRINKAGE DATA - FM-10001 NYLON

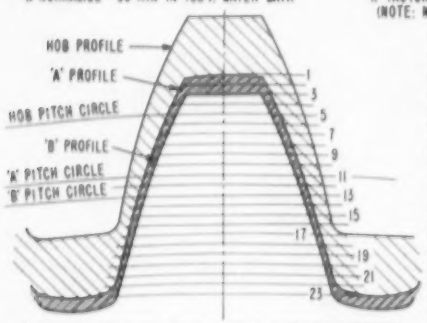
GEAR DATA
20 dp
47 teeth
20° pressure angle
(Made 0.006 undersize)

Injection time - 8 sec
Time delay - 8 sec
Mold temp - 120 F

PART NO.	REQ'D PART		HOB			CAVITY		PRODUCTION PART (RAN SMALLER TO GET BACKLASH)				PROD. PART (TIME DELAY - 20 SEC)	
								BEFORE NORMALIZE		AFTER NORMALIZE *		BEFORE NORMALIZE	
DIMENSION	M	OD	M	OD	RD	OD	RD	M	OD	M	OD	M	OD
250178						2.480		2.4466	2.4233	2.4485	2.4247	2.462	2.4406
250177	2.464	2.444	2.5066	2.4923	2.2680	2.481		2.4463	2.4200	2.4485	2.4220	2.463	2.4394
250180						2.486		2.4496	2.4243	2.4517	2.4261	2.4686	2.4424
AVERAGE						2.4823		2.4475	2.4228	2.4498	2.4243	2.4645	2.4408
SHRINKAGE						0.010		0.059	0.0695	0.057	0.068	0.0421	0.0515

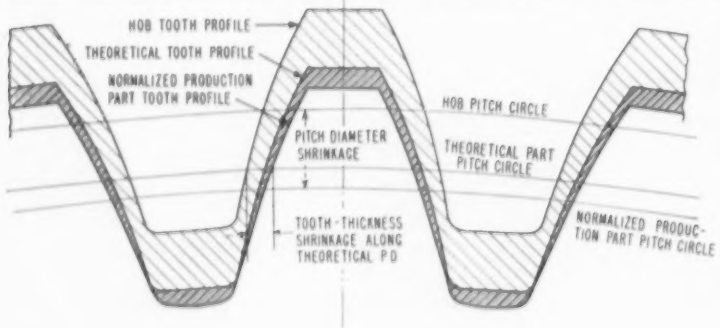
* NORMALIZE - 30 MIN IN 185 F WATER BATH

'K' FACTOR = 1.021 (HOB TO NORMALIZED PART)
(NOTE: NORMALIZING SHRINKAGE IS MINOR)



	HOB	PART 'A'	PART 'B'
OUTSIDE DIA	2.492	2.444	2.424
'M' OVER 0.0864 PINS	2.5066	2.468	2.450

TOOTH THICKNESSES				
NO.	DEPTH	ST'D PART	PROD. PART	OVERSIZE
1	0	.0355	.037	.0015
2	.005	.0405	.0415	.001
3	.010	.0455	.0465	.001
4	.015	.0505	.051	.0005
5	.020	.055	.055	
6	.025	.0595	.0595	
7	.030	.0632	.0632	
21	100	.1035	.1072	.0037
22	.105	.106	.110	.004
23	.108	.1075		
24	.110		.111	



	THEORETICAL PART	HOB	NORMALIZED PROD. PART
PITCH DIA	2.342	2.392	2.324
'M' OVER 0.864 PINS	2.464	2.5066	2.450

RATIO $\frac{P.D.S.}{T.T.S.} = \frac{.034}{.0115} = 2.95$

NYLON-GEAR SHRINKAGE WAS MEASURED at increments of 0.005 in. down to full tooth depth, which produced data for predicting shrinkage in production part (and for similar parts of about the same size and thickness). Differences in dimensions between hub and molded workpiece are also charted. These, plus those of completed gear, are as of a given time, under given conditions at Friden and may not apply to other cases. They do indicate the direction and amount of shrinkage that might be expected in similar parts

only one that didn't wear at critical spots after 50 parts or so. It has produced thousands of parts without showing visible wear. Hard-chrome plating has been applied experimentally to Kirksite when wear occurs.

NORMALIZING (BOILING)

Before molding, nylon powder is sensitive to moisture and must be kept dry. It is heated at 170 F for four hours; then kept dry at the injection-press hopper by hot air blown over it constantly.

But after molding a certain amount of moisture is desirable to prevent brittleness. If the amount of moisture in each part can be stabilized, there will be little dimensional change later. Therefore parts are immersed in boiling water, which doesn't harm the material. Treatment for parts with ⅛-in. walls lasts 15 min.; for ¼-in. walls, it's 30 min.

A typical nylon part would be molded in 8 sec, clamp time would be 8 sec, with a mold temperature of 120 F. Heat-chamber temperatures would be 500 F at front and rear; 495 F in the middle. Machine pressure is 10 tons.

Juggling any of these factors results in changing the final dimensions of the part, so tight control is essential. Even with good control, a properly normalized gear molded in a cavity 2.392 in. across would measure 2.324 in. The trick is to make shrinkage standard and predictable.

COLOR CODING

An interesting development is the use of standard household color dyes for small nylon parts. Several sizes of small shaft clips are molded 100 to a shot in a 35-sec floor-to-floor cycle. These are almost impossible to tell apart, one size from another, so each size is coded one color, which is added to the normalizing bath. The color also proves the parts have been properly normalized.

MACHINING PROBLEMS

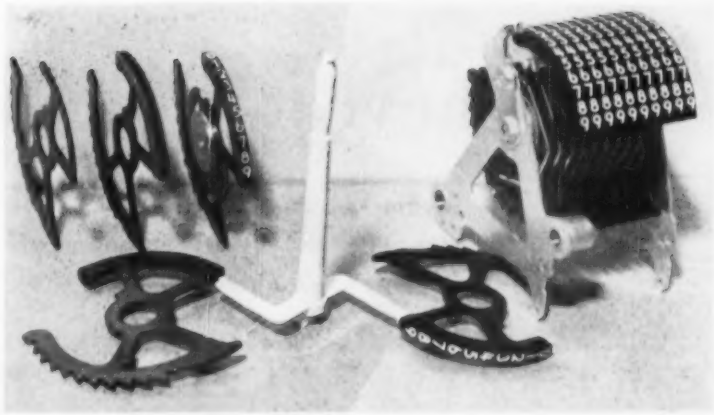
Nylon cuts much like brass stock, though tungsten-carbide tools are applied exclusively. Burrs

on the parts are always a problem; and chips come away from screw-machine tools long and stringy, like linen threads. These are broken up by a chip cutter.

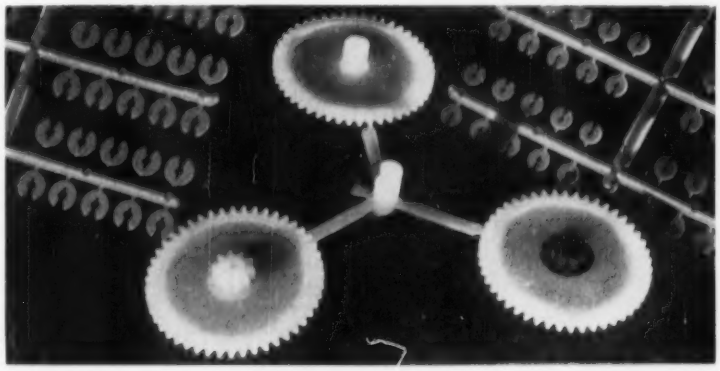
Soluble-oil coolant is required for machining, because cutting heat would otherwise damage the nylon stock. The oil must be removed, which requires centrifugal separation and often steam cleaning.

Small parts are hard to separate from chips, and must be picked up by hand. It's been suggested that a cotton gin might do a good job of this, though it hasn't been tried so far. Most of Friden's machining lots are small because they are generally experimental work.

Two of six injection-molding machines in the shop now work nylon full time making small parts for calculating and other machines.

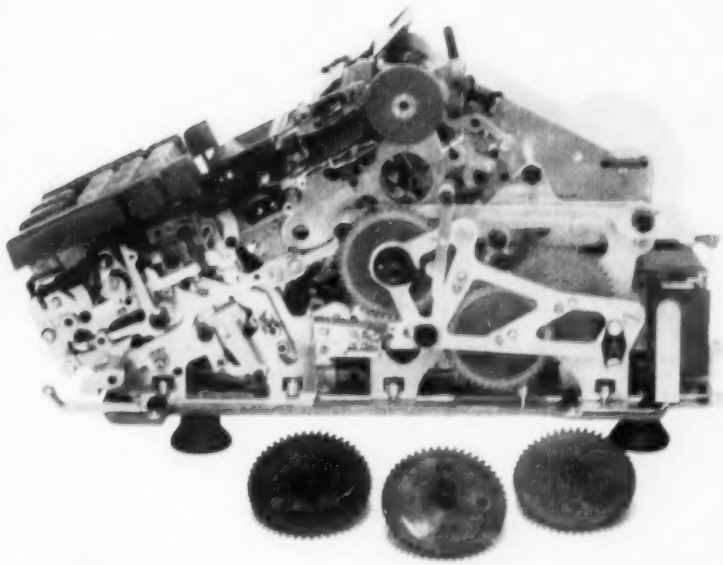


FINISHED TWO-COLOR MOLDED-NYLON DIAL SEGMENTS as they come from press (left) and assembled on metal axle (right)



THREE GEARS, BEFORE NORMALIZING, are as molded for train in calculating machine. Small clips are shown in two sizes of different color. These anchor shaft ends by slipping over machined necks

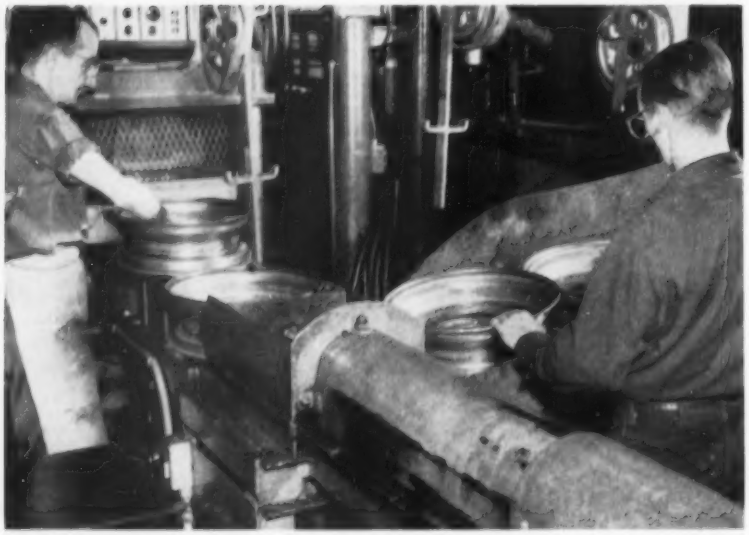
NORMALIZING TANK is treating calculator idler gears. Unit is electrically heated, and holds parts at 180 F for 30 min. Color is also added here to show parts have been treated



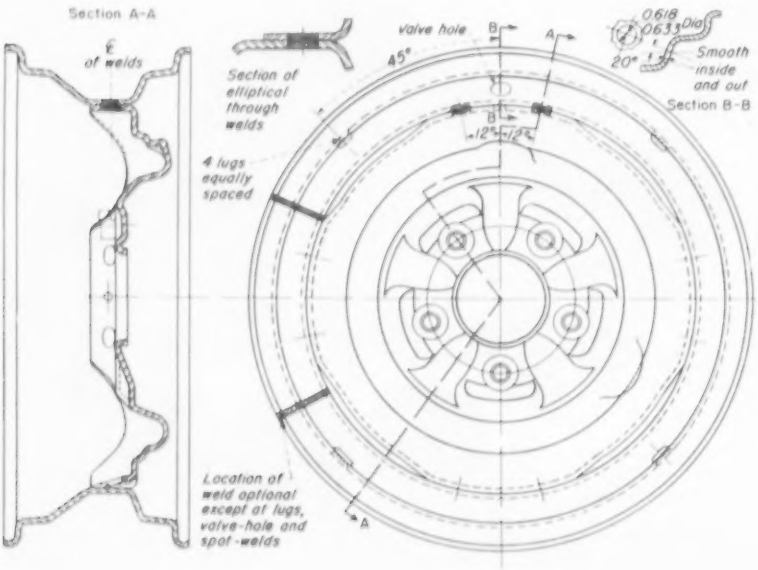
THREE-GEAR TRAIN fits into adding machine on the side. Different appearance is due to normalizing, coloring, and burr removal

Chevrolet welds wheels now

Riveting abandoned, so new setups are required at Detroit Gear & Axle Div. They also pierce and form—improve quality and output. There's more mechanized handling on other operations. Here's a report in pictures on wheel and "banjo"



AUTOMATIC SPOT WELDING jumps production and improves quality of passenger-car wheels, formerly riveted. In comparative destruction tests, welded wheels are 50% stronger—and production rates are now around 700 assemblies per hour at each of two machines. Two operators at each machine load and position rims and disks before they are automatically welded, pierced, chamfered, and dimpled



GEORGE H DE GROAT
associate editor

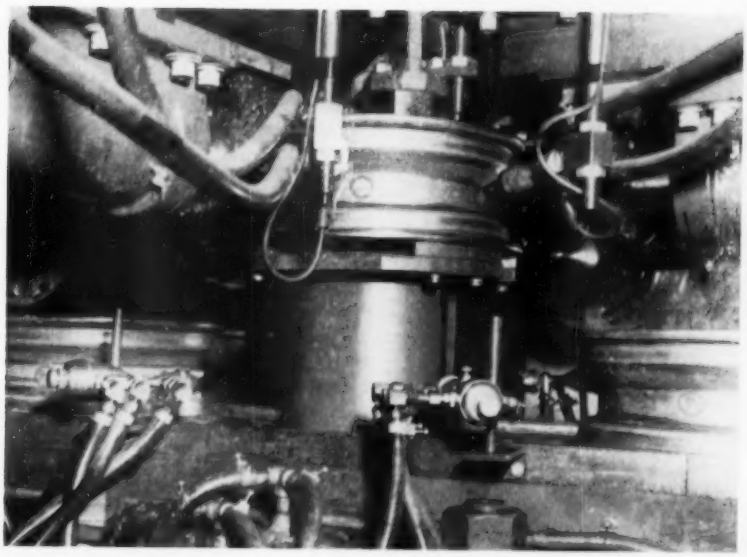
Changeover from riveted wheels to welded assembly of disks and rims brought a unique spot-welding setup that also pierces and chamfers valve-stem holes and forms four projections in the rim for hub-cap retention. This is one of numerous innovations at Chevrolet's Detroit Gear & Axle Div, designed to increase production rates and improve quality. A 30,000-lb min load is imposed in destruction tests, (0.1% of all assemblies) to check the type of failure—parent metal must fail in tension rather than a shear failure at the weld.

Before reaching this setup, however, coil stock 0.120 in. thick is cut, rolled, and butt-welded to form wheel rims. Flash trimming follows, after which two forming operations are performed. Two rolling operations and an expansion setup insure roundness—then rims are delivered by overhead conveyors to a special hopper at the welding setup.

Disks are 0.123- to 0.139-in. strip steel blanked, formed and pierced in a series of six presses before going to the welders on monorail conveyors.

WELDING IS AUTOMATIC

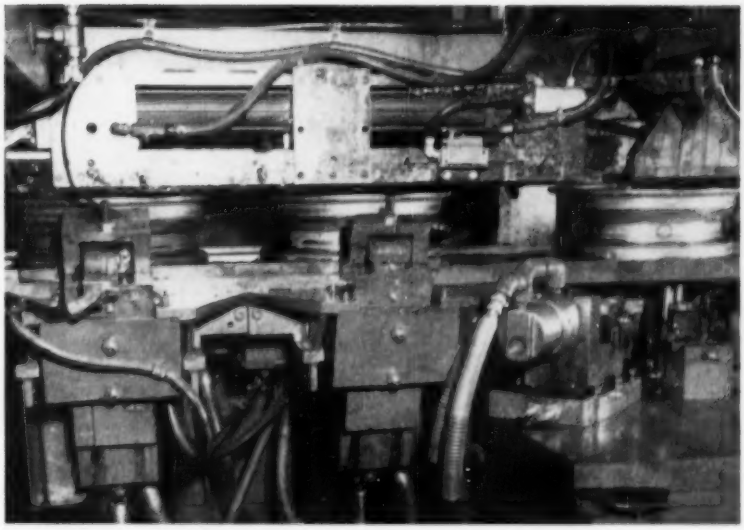
Two Sciaky welding installations are employed with a common hopper that delivers rims first to one, then the other. At present, five rims are delivered alternately to the welders, but controls at the machines permit changing this to any desired combination—includ-



WHEELS ARE LIFTED out of the transfer line by a hydraulic cylinder for spot welding disk and rim assembly. After assembly reaches a positive stop and is clamped, four welding heads, 90° apart, are actuated to move in, make the welds, and withdraw. Work then returns to the transfer mechanisms for delivery to a second welding station where four additional welds are made in the same way

ing 100% delivery to one machine if the other is down. A gravity-feed roller track carries rims to a conveyor where an operator positions them so the previously welded seam is not aligned with spot-welding heads. After proper positioning, a hydraulic cylinder pushes each rim into a transfer mechanism that carries it through the machine. Before the rim enters the machine, however, a second operator unloads disks from a monorail conveyor and places one in each rim, preparatory to assembly at the first station. Here a hydraulic ram lifts the assembly into engagement with a seating tool that presses the disk in place. After being returned to the transfer mechanism, the assembly is carried to the first head where it is raised out of line again for spot welding.

Four spots are produced here, 90° apart, after which the assembly proceeds to the second welding station where four more are added —between the first ones. Altogether, eight elliptical welds are produced, 0.44 in. min by 0.68 in. min, spaced 12° apart.

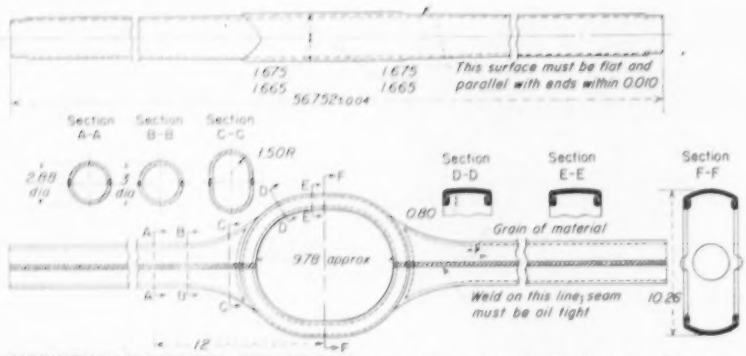


SPECIAL HYDRAULIC HEADS pierce and chamfer ½-in.-dia holes in wheel rims after welding. Assemblies supported on the transfer mechanism are aligned with heads and clamped in position for piercing one hole in the rim (left), then chamfering in the second head. Limit switches actuate hydraulic cylinders that apply pressure after positioning the heads. Tools enter work from underneath and enter dies in the upper arm of each head. Third setup (right), has four equally spaced, hydraulically operated heads that engage the wheel for producing small dimples by which trim disks are secured

100% INSPECTION

Transfer to a piercing station is next, where a special hydraulically operated head produces a ½-in.-dia hole in the rim. A second head chamfers this hole, after which the work enters a fixture where it is clamped while four equally spaced projections are embossed around the rim.

Wheels are then ejected into a track for delivery to two inspection stations. The track is split—each section leading to an inspection setup—and wheels are alternately guided first into one and then the other by a pivoting arm that closes off one track after a wheel passes so the next wheel is directed into the other section. The two inspection stations at each welder permit 100% inspection for roundness, concentricity, and general appearance. From inspection, wheels are gravity-fed to a pickup point where "ice-tong" carriers on



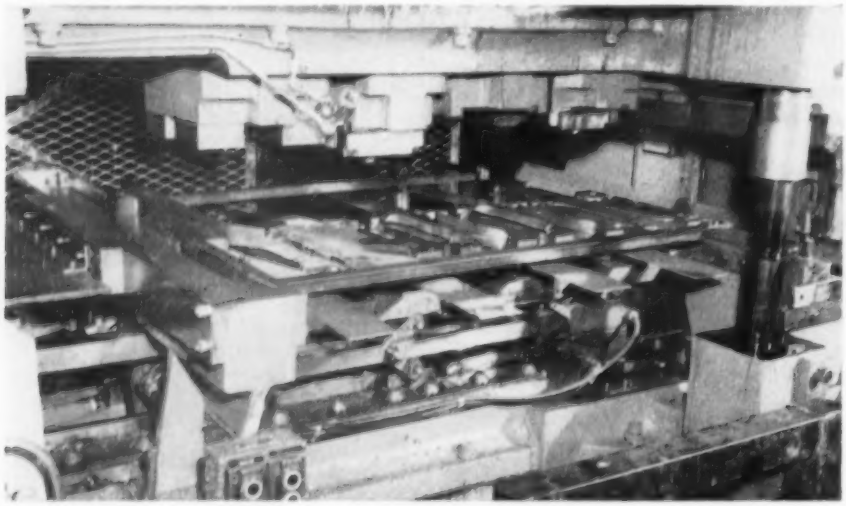
INGENIOUS STAMPING OPERATIONS form HR steel (AISIC-1010) sheet into rear-axle housing halves. Material is 0.146 in. thick—blanked into flat irregular shape two at a time before forming into "banjos." Welding two halves together follows forming and coining

Chevrolet . . .

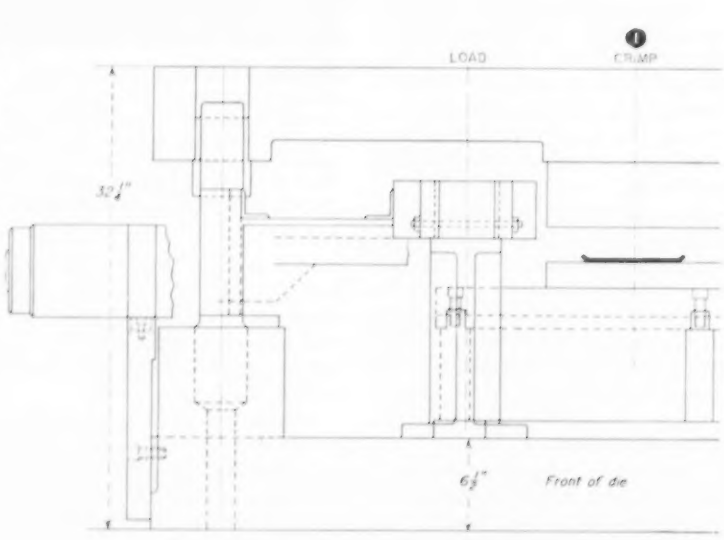
an overhead conveyor engage them for transfer.

MECHANIZED HANDLING

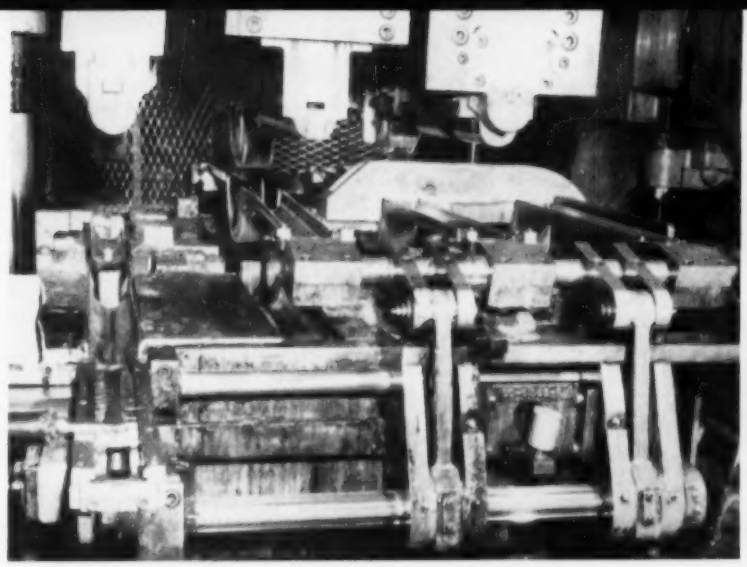
Mechanical aids have been installed at conveyor junctions where work is removed from one and loaded on another to conserve manpower, eliminate fatigue, and increase efficiency. Same with numerous machining setups where clamping and locating have been made automatic.



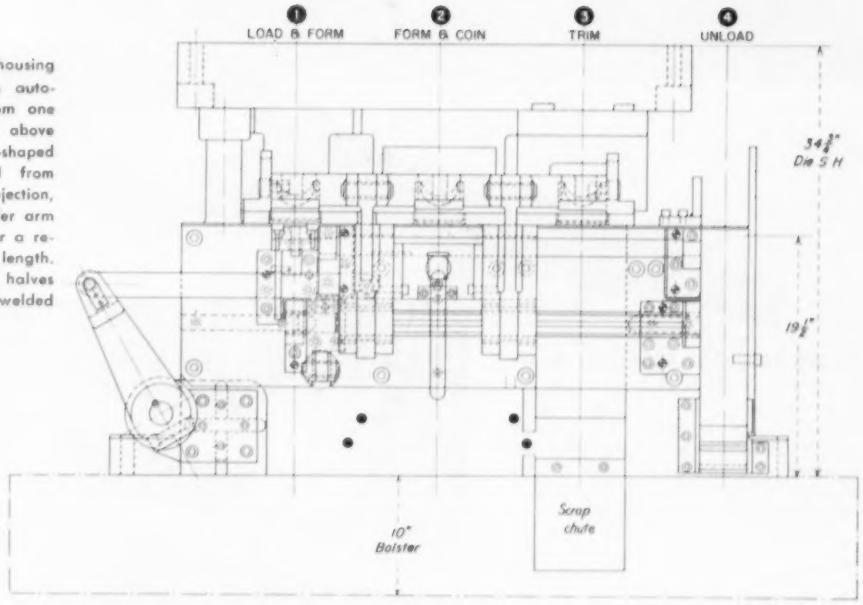
WALKING-BEAM TRANSFER MECHANISM in this 400-ton Bliss press speeds the forming of passenger-car rear-axle housing halves. Blanks in magazine at the left (see photo above and drawing at right) are fed from the bottom into the transfer unit—carried to a light crimping operation at the first die. Lubricant is automatically applied here, too. 90° flange bends are made at the second die and rolled inward to form a V at the third—and finally closed or flattened down at the fourth, to form a reinforced section in the part. Ejection is automatic, and production rate runs about 700 pieces per hour

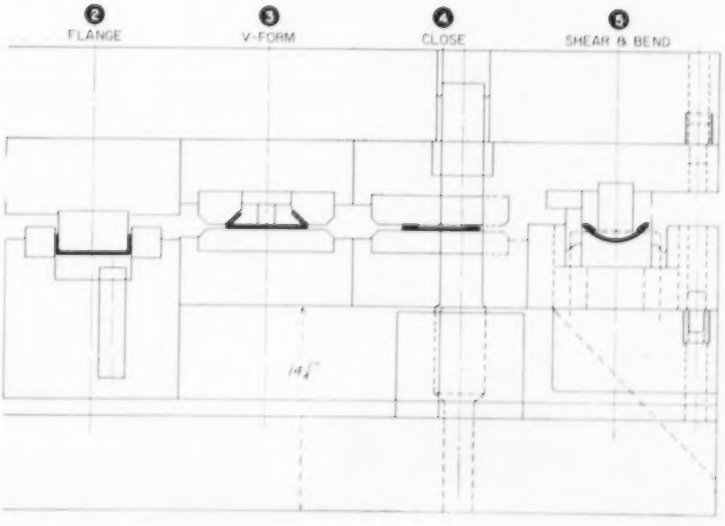


New ideas are used in other stamping operations, too. One setup, for example, employs a "walking-beam" transfer mechanism for moving rear-axle housing halves through several forming operations. After ejection, formed parts enter a belt conveyor for transfer to a positioner at a second press. This unit, situated at a 90° angle to the conveyor, aligns the work with the first of three dies in the press. Loading is manual here but, again, transfer from die to die is automatic, as is ejection. Production rates at these two setups run about 700 pieces per hour.

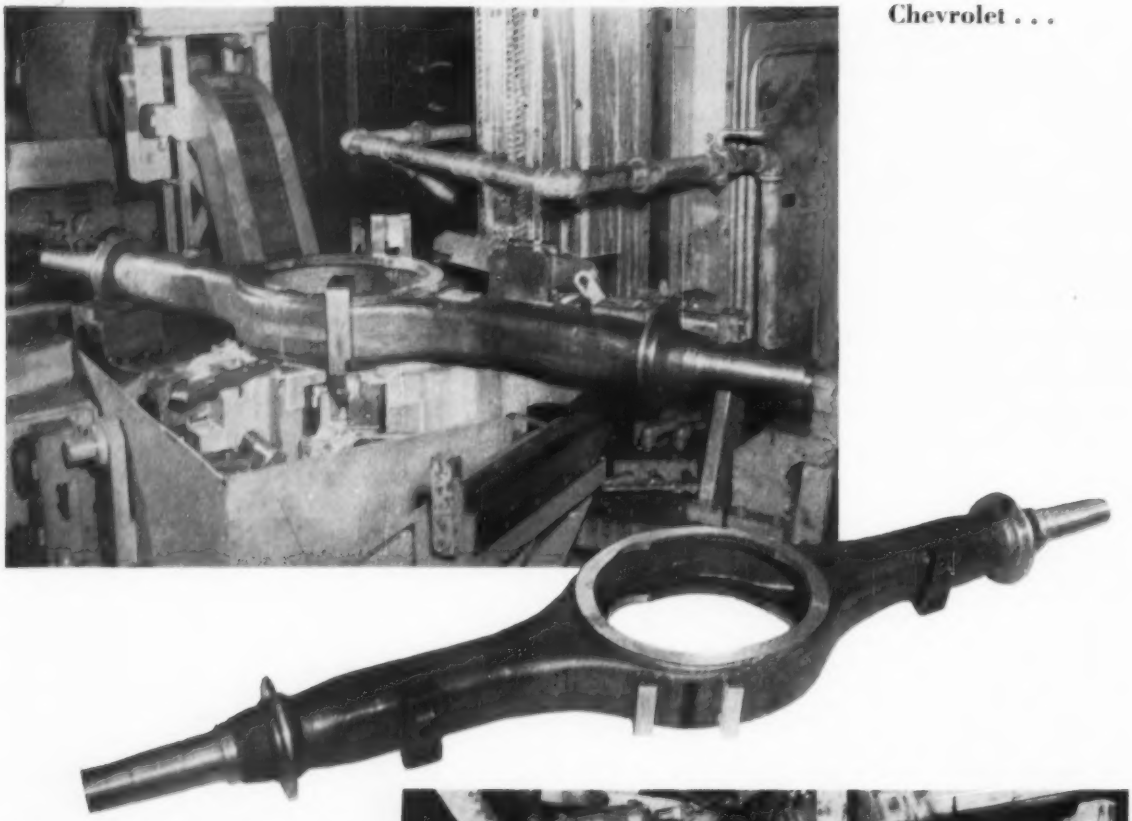


THREE DIES DEEP-DRAW housing halves into banjo shape, with automatic transfer of the parts from one to another. First die (see photo above and drawing at right) forms U-shaped channel in flat stock received from first forming press. After ejection, work is picked up by the transfer arm and carried to the second die for a restrike. Third die shears ends to length. After automatic ejection, formed halves are inspected prior to being welded together

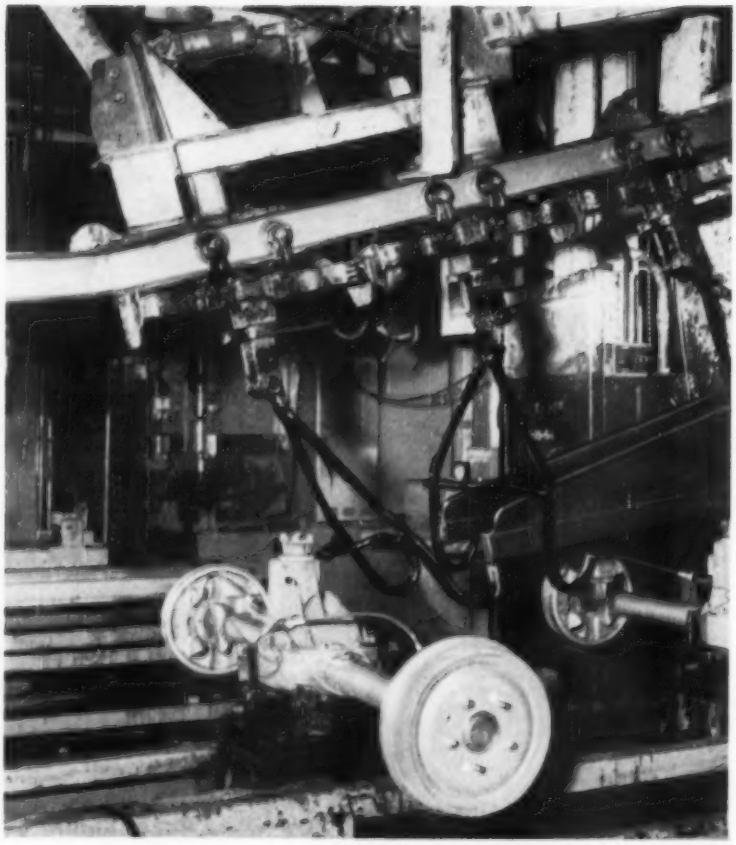




TURN PAGE FOR MORE PICTURES



WELDED PADS ARE BROACHED at over 100 per hour in this single-ram Colonial setup for machining truck rear-axle housings. Automatic fixture is operated by a special hydraulic circuit to locate and clamp the part in position. After fixture is loaded (20 sec time allowed), the table moves in to broaches operating at 30 fpm. Return broach speed is 60 fpm



AUTOMATIC 'KICKER' SAVES TIME and money in transferring rear axles and wheels from assembly-line conveyors to an overhead monorail for transfer to a paint booth. Previously, assemblies were manually hooked on. Now, axles engage a lever as they travel forward, thus tripping a limit switch that actuates an air cylinder overhead. The cylinder piston moves out to pivot a bell-crank mechanism that normally acts as a stop, thereby releasing one hook at a time for gravity feed into engagement with one axle

Care keeps live centers longer

Engineers at Ready Tool Co, Bridgeport, Conn, answer the questions most frequently asked them about live-center maintenance

Premature "death" of most live centers is caused by either misuse or improper handling and storing. Remember, a live center is made with a precision bearing, as a precision instrument—satisfactory final results are dependent on the continued accuracy of that bearing.

In the final analysis, the accuracy of an anti-friction center depends entirely upon the precise action of its bearing. Generally, anti-friction bearing centers should satisfy these requirements: (1) accuracy, (2) rigidity, and (3) dependability. Precision work and longtime center life are almost impossible when any one, or all three, of these qualities are missing.

Bearing manufacturers have adopted a "standard measurements" method which they call the center's B-10 life factor. Simply defined, the B-10 factor means that about 10% of all bearings will fail prematurely, while the balance of 90% are expected to outlive their normal life by five times.

Knowing that bearings have a certain life expectancy, manufacturers supply the information a user needs to determine the load limits each bearing will be able to handle comfortably in order to protect this life expectancy. It is important that the user do whatever is necessary to safeguard and extend this B-10 life factor set up by the manufacturer.

As always, proper care and maintenance of chucks, drills, spindles, and other machine tools and accessories used in connection with the center units is essential. Of primary importance is the choice of the correct center for the job at hand. *Be sure the center fits* the machine.

When choosing a center, check the machinery manufacturers' specifications. They will show the taper size of the center best suited for your machine. However, when it comes to the style of center to fill a special need, the center manufacturer is better able to help you, as he knows which type of center is best suited for specific work. Careful reference to literature supplied by center manufacturers offers assistance along these lines.

It is very important to follow the machine-tool maker's recommendations when working with extreme loads or at extreme speeds. If in doubt, ask the center manufacturer to suggest the best center for your specific problem. He should know which center will be best, for he has all the machine-tool builders' specifications and technical data at hand. If it is necessary to make a special center, he can do this, too, and guarantee the accuracy you require. He will engineer the tool to fit the application.

Generally speaking, a center made for lathes will suit a number of lathe applications and, conversely, a center made for grinding machines fits a number of varied grinding applications. But you will find you'll be missing the finer results if you try to use a lathe center on a grinding machine, and vice versa.

Before bringing the center up to the work, re-check the centerhole. Ask yourself: (1) Is it drilled properly? (2) Do the center and hole make a good match?—are they in alignment? A hole too small, with a point too large, or the reverse—a hole too large with a point that may be too small, will soon cause trouble. The eventual result is damage to both work and center. Moreover, this error can exert extreme pressure on the bearings, ruining them before the job has even started—or worse, raise production costs far above normal.

When the work is rotated on solid centers, hole size, alignment, and accuracy are always important factors as the resulting roundness of the work is only as accurate as the accuracy of the center hole. Using a live center instead of a 'dead' center overcomes some of the inaccuracies of the center hole. The point turns with the work and, if the hole is correct, the work and center are in perfect contact with each other, making an integral combination.

Roundness of a hole is usually a little off anyway, regardless of how carefully it is drilled. Neither your eye nor the drill is ever perfect.

Questions about the proper "handling" of centers made up a large portion of those asked of Ready Tool engineers. First and foremost, avoid dropping or banging the centers. Certainly, they should be protected against severe blows. "Handle with Care" is your byword where centers are concerned.

It is not hard to imagine what may happen to the inside or bearing assembly of a center that is handled carelessly. Moreover, any damage to the point, shank, or head may ruin the entire center. For these reasons the center should be considered a delicate precision instrument, just as important, and valuable, as any of your testing equipment. Handle it gently at all times! Never leave a center lying on a machine bench. Instead, give it a light coat of lubricant or rust preventative and return it to the crib. When not in use, the center should be put in a box and stored.

Check centers for "run out" both before and after use, especially if the center has been in an accident. You will also find it worthwhile to have an extra center on hand in case of emergency. Where possible, buy centers in matched pairs. Then, while a damaged center is being repaired, its mate is always ready to take its place. In grinding operations, a matched pair is necessary and these centers should always be used together.

Dirty centers cause poor results. Always clean the center before using it. Be positive no dirt, grit, or other foreign matter clings to the shank or point. See that it is absolutely clean, and that it fits into the stock or chuck properly.

When the center overheats it is a sure sign that something is wrong! A solid center should be lubricated regularly. Be cautious if it heats excessively. The chances are the center is not made for the load, speed, or job expected of it.

Never try to repair a center yourself. It should be returned to the manufacturer when anything goes wrong. Some center bearings are "special" and only the center maker possesses the tools and precision instruments with which to make an accurate check, recheck, and repair. He is best qualified to rebuild the center, too. For a nominal repair fee the manufacturer will repair it and guarantee the center's accuracy for a second time.

What are the responsibilities of a manager?

First of all, to the people managed, says Mr Miller. Success lies in getting the best work, not just the required work. Here are ideas on achieving that goal from a recent talk to Dartmouth students

J IRWIN MILLER, chairman of the board, CUMMINS ENGINE COMPANY, COLUMBUS, IND

Essentially, a manager is one kind of leader, and in that respect the profession of manager is no new profession. The common characteristic of the classic leader has always been a capacity, above that of normal men, to spend himself, to pour himself out, to devote himself with a single mind to the aims of his leading. Unless you and I understand this fact with something more than our minds, we cannot come close to understanding the responsibilities of the manager. Note that I did not say "the responsibilities of management"—I said "the responsibilities of the manager." For we must first understand the responsibilities of the manager before we can hope to understand the responsibilities of management.

The most important thing to understand about today's manager is that he has in his possession a very considerable amount of power over other human beings. I don't say power over dollars, or over a great quantity of physical assets. This latter he has, of course, but the power over things—the dollars or the assets—becomes significant only when we conceive of the things as belonging to and being important to some individual. So the manager has power over other human beings, both as to their material possessions and as to their time and the way they spend it.

Now this does not necessarily mean that he is "responsible" for the use of his power, for the dictionary reminds us that the word "responsible" means "accountable to or answerable to" someone for something. Ancient kings and despots had enormous power over other human beings, but more often than not they felt no responsibility in the use of their power. They believed their power was theirs by right of ownership, and they felt accountable to no one for its use. True owners do not feel particularly responsible for what they own.

So if we assume, as we apparently do today, that the manager is accountable and responsible to someone for the use of his power, then it may very well be that we mean by this that the manager is not the true owner of his power over people, and that his responsibility, therefore, is to the true owner. Now at last we may be getting somewhere. If we can find this true owner, we shall probably have a good start on the understanding of the true nature of his responsibility.

You might very well say that we have made a great deal of fuss about nothing, and that all we have to do is look at the corporation's organization chart. That chart says that you as a manager received your power by delegation from your superiors; so, therefore, the manager is responsible to his business boss. Let's chase this power and its delegation on up the chart. We finally arrive at the fellow who is increasingly referred to as the chief executive officer, which perhaps more accurately defines his job than either of the more familiar titles of president or chairman. But even this fellow, the chief executive officer, if we are to believe the chart, is not the final owner of management's power, because the chart asserts that his power in turn comes from the board of directors and that their power comes from the shareholders. And there the chart ends. Law and custom tell us that the shareholders are the owners, and we may therefore easily assume, as managers of the past almost always did and as many do today, that management is responsible to the shareholders in today's business society.

Well, you may say, "Why not?" There is only one trouble with this, and that is that this very clear conception, once held nearly universally in flawless perfection, is now beginning to show a few cracks around the edges. Management, which was once more confident of its responsibilities than it is today, now is beginning to feel an uneasy compulsion

to put other interests ahead of those of shareholders, and to recognize responsibility to other owners.

Earlier, I made the assertion that the most important thing to understand about today's business manager is that he is in possession of a very considerable amount of power over other human beings. I might add to this another assertion. The manager has to have this power over other human beings to do his job. If the human beings under his direction don't do what he says, then he is a failure as a manager, no matter what material assets may be at his disposal, no matter what knowledge, what experience or capacity he may have as an individual. If the people who supply him materials don't furnish him the materials that he orders in the quantities and the quality and in the time that he requires, or if his workmen don't come to work when he says or leave when he says or spend their time as he says, or if his salesmen won't go where he says or call on the customers he wants them to call on—if any or all of these people, or other persons in his employ and subject to his power, do not respond to that power and to his orders, then the business manager is utterly helpless. For so complex and interdependent has become his world today that he can do nothing by himself.

MANAGEMENT IS NOT "BOSSING"

Well, who is it that makes all these persons submit themselves to the manager's power and authority? *The truth is that nobody makes them do it.* His suppliers don't have to sell to him; they can, if they want to badly enough, sell to someone else, and often they do. The workers don't have to work for him; they can, if they want to badly enough, go and work for someone else. And so can the salesmen, for all these people who are under the power of the manager are free persons in our free society. Nobody makes them submit themselves to his power. So the power that the manager has to have in order to do his job is given to him freely by the very persons over whom he uses it. And the most important thing, therefore, to understand in our society today about the responsibility of the manager is that *he is answerable, accountable, responsible first of all to the very people whom he manages.* Of course he is responsible to other interests and groups too. His responsibilities to his shareholders are great and important. His responsibilities to his customers are formidable. But the essential and distinguishing characteristic of today's business manager is that he is not a personal worker; he is a man who can be useful and effective only through the work of other people. And because these other people are free to give or to withhold their work, he must never lose his awareness of the fact that his powers have been entrusted to him by the very persons over whom he exercises them.

So the business manager begins to understand the true nature of his responsibilities when he starts with an awareness that his first responsibility must be to the very people whom he manages. You may now reply that the freedom of the worker is not very real and is only an apparent one. You can say that, after all, a man has to work some place, and that, while he may be theoretically free to move and work somewhere else, in fact he becomes tied tighter and tighter to his job as each year goes on. You can say his investment in his house ties him; his children and their school problems tie him; finally his seniority ties him, and his pension rights tie him. So perhaps he isn't perfectly free to quit his job. But he is terribly free in a sense that is even more important to the business manager, because he is free at any time to do less than his best work. And the distinguishing mark, after all, between a good company and an average company can be discovered when you find out whether the spirit and the atmosphere of the company encourage men to do their best work rather than their required work. The successful foreman, for instance is the one for whom men want to work. The successful manager is the one for whom people voluntarily and freely do more than is required of them. And this is the reason why *the manager's first responsibility is to the free people over whom he exercises his power and whom he manages.*

The next question should then be: What difference does it make? How does the acceptance of this idea make any noticeable difference in the way a corporation conducts its corporate affairs? Does it make a difference, for instance, in the way a management deals with the subject of union labor?

Let us start off with the management that considers itself the owner of the business. That type of management says, "This is my business and I have the right to run it my way, and no lousy union is going to tell me how to run my business." This type of management writes clauses in labor contracts, if it is forced to sign one, which emphasize management's prerogatives. And it conducts its relations with the union on the basis of permanent war, never quite abandoning the hope that someday it will be rid of the union. The management and men, under this concept, are likely to live out their lives together, each seeing how little he can give, each seeing how much he can extract from the other. And this kind of management usually can prove to itself that it is on the right track, because all the evils of labor unions which it has anticipated actually come to exist in its own union.

THE GROUP VOICE IS LOUDER

On the other hand, the managers and managements which consider themselves answerable to their people might be expected on the subject of union labor to be sensitive to the realization that, as men form themselves into larger and larger groups, inequities do occur, injustices do happen, and confusion is born which renders men frustrated and unhappy regardless of the best efforts of all involved. They begin to realize that the best system in the world by itself will not suffice to see that individual injustices are corrected, wage scales fairly administered, discipline reasonably handled. As American business becomes larger and larger, the

men who are subject to the power of management cannot be heard individually. These men in all too many cases can be heard only when they band together and acquire a power that commands management's ear and management's respect.

Of course there exist corrupt, racket-ridden and autocratic unions, and I myself have dealt with some. There also exist incompetent and arrogant managements, and you have read about them in the newspapers. But, while you read further in the papers about the tragic union-management situations that occur in this country, there exist also with little or no notice union-management situations of strong mutual trust, common purpose and genuine respect. Many managers will tell you today that they could operate neither as efficiently nor as profitably without a union. And such managers are not only sensible of the first responsibility of management as we have defined it here, but are genuinely held in industry to be uncommonly successful businessmen. This same concept of responsibility applies with the same force to the leadership of union labor, for the job of the leader of a great national union is the same in its core as that of the business manager. The labor leader's first responsibility is to the persons over whom he has been given power.

RESPONSIBILITIES ARE "KICKED" AROUND

Unfortunately both management and labor kick their responsibilities around a good deal today, and, when they do, they get into trouble. An example of this is seen in the current comedy which is being played out in legislatures and Congress under the titles of "Slave-Labor law" and "Right-to-Work law." The Taft-Hartley Act, about which I must confess I don't know much, except that I can be sure it is far from perfect, wasn't named "Slave-Labor law" by the workmen, for whom it offers some measure of protection against being pushed around by union bosses. It was so named by the labor bosses whom it restrains, and all their tears have not yet convinced the voters.

By the same token, the "Right-to-Work laws" one might suppose to have been named by the workmen who were trying to gain the right to work, but no, these laws have been written and named by management, who wishes to be able to prevent a union-shop contract even when the men want it. In their attitudes toward these two laws, labor and management are still today acting like owners, responsible to no one. But in the rather cynical names that they have applied to these two laws they recognize that the public expects them to act more responsibly than they do, and that the public expects them to be responsible to and concerned for their people.

We have some more phrases that we work pretty hard today. One of these is "freedom" and another one is "private property." Let us see what different things these phrases can mean to our society, on the one hand, according to the way our "owner" type of management might consider them, and, on the other hand, according to the way our "responsible" type of management, as we have defined it, might.

The term "freedom" to an owner means that this is my plant and that I should feel free to run it the way I want to, to fill the air with noise and smoke and smells if I want to. Now this concept of freedom is well understood by savages, beasts and small children. But this exclusive definition of freedom as *my* freedom—is this really what the Western world says it is fighting for? I don't think so. I think we are fighting for a more responsible definition.

"FREEDOM" IS FOR EVERYBODY

We have asserted that the responsible manager knows that he is responsible first of all to those he manages. So he might be expected to understand that the term "freedom," if it has validity, means not my freedom but rather an awareness of and a sensitive concern for the freedom of the other fellow. A society concerned for the freedom of the other fellow becomes a society which can compel and win and change men. It becomes a society that is all the things we claim for Western society. And it becomes a responsible society.

The same is true of the phrase "private property." There is nothing new about a concern for my own possessions, but there is something new and compelling and responsible about a society concerned for the property of the other fellow. You can take the idea from here. You can decide for yourselves how the responsible management will respond to the claims of customers, or to the claims of the government and taxes, or to the claims of suppliers, or to the claims of the community in which it exists.

And now what does a manager or a management have to do to discharge this responsibility? Certainly to discharge it a management must first of all be aware of it. And awareness means waking up. It means spending yourself on it, pouring yourself out on it; first of all, with genuine affection and concern for those who entrust their best years to your direction; second, with strong courage to evaluate and choose between competing interests and to go down with your choice if necessary; third, realizing that the only sure thing in life is change, accommodating yourself to change at all times thoughtfully, but never giving it blind resistance; and finally you will cultivate the ability to work for and with others, which ability is the cement of our society.

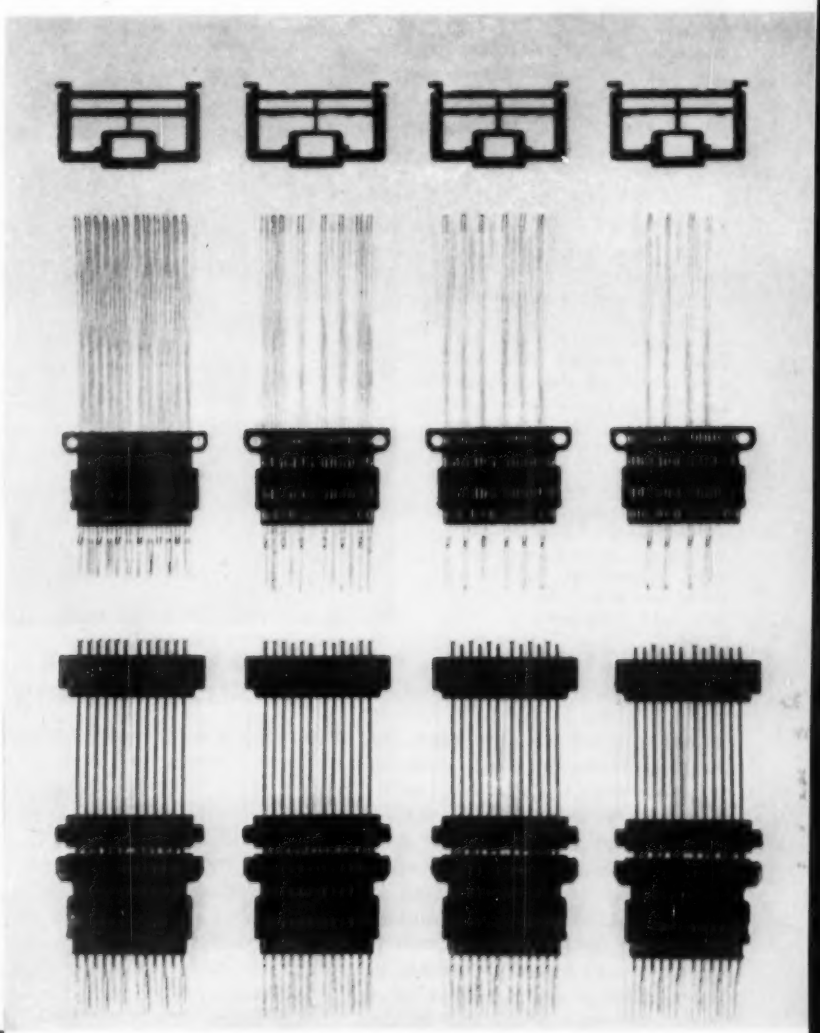
CURE FOR ULCERS

Now I hope I have not dismayed you with this formidable notion about the business manager and his responsibilities. It is true that all too often the life of the average business manager today is characterized by ulcers, early heart attacks, broken homes, a feeling of frustration and futility. It need not be the case. And an understanding of the responsibilities of management is really at its core an understanding of the opportunities of management.

If you understand these, and if, when you have your opportunity, you seize it with faith and without counting the cost too carefully, then I can guarantee that you will find the rewards of management greater than you had ever hoped they might be.

American Machinist

SPECIAL REPORT NUMBER 429



CLOSE TOLERANCES ARE HELD . . . in making components of wire-spring relays. Single and twin-wire sub-assemblies are made automatically — starting with special wire-straightening equipment and plastic molding, through blasting, wire forming, contact welding and other operations. Complicating the problem of manufacture is the need for a wide variety of different kinds as well as precise location of contacts at the ends and other critical dimensions

New tooling and techniques work wire...

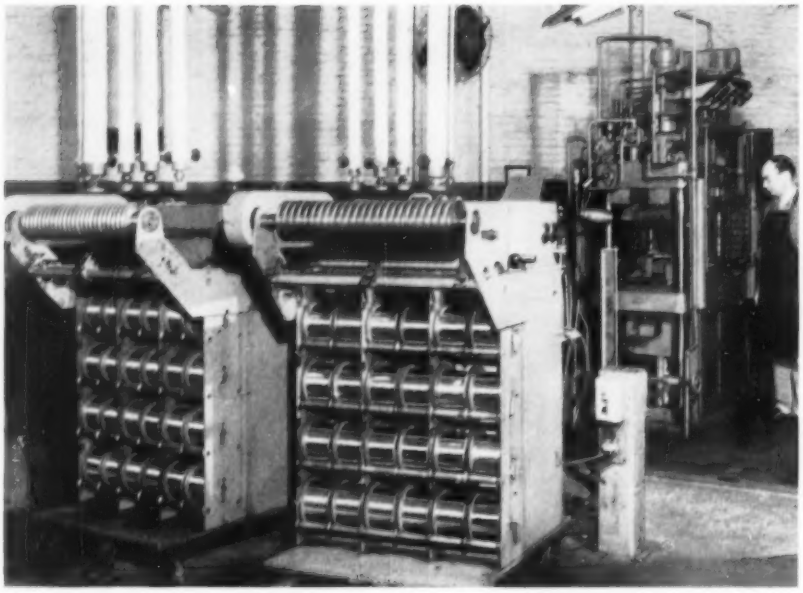
JAMES W RICE,
assistant superintendent,
development engineering
WESTERN ELECTRIC CO, INC,
CHICAGO, ILLINOIS

The wire-spring relay is an electromagnetic device in telephone switching systems for closing or opening electrical contacts on dial calls. For telephone exchanges all over the United States, millions are produced annually at Western Electric's Hawthorne, Ill, plant. Manufacturing costs must be low, so considerable ingenuity has been expended in developing special tooling and machines.

Relay components are principally wire arrangements with contacts and plastic bodies. Among setups for making them are automatic double-head wire straighteners, progressive dies with automatic plastic-molding stations, and mechanized welding and forming lines. This report describes techniques and equipment of widest interest and application to other metalworking plants.

COPYRIGHT 1956 BY McGRAW-HILL PUBLISHING CO, INC, 330 W 42 STREET, N Y 36, N Y

New tooling and techniques work wire...



SPECIAL WIRE-STRAIGHTENING machines carry 24 reels of wire each (others carry 30) which are straightened and fed intermittently to a modified hydraulic press for molding into wire blocks (right rear). Machines are mounted on wheels to facilitate movement from one press to another if required and to the maintenance area for cleaning and reloading with full spools of wire. Automatic controls start and stop the straighteners to maintain the desired partial loop in the wire according to demand at the press

Wire-spring-relay manufacturing is complicated by the wide variety of types required. One type, for example, the "twin"-wire block, is made up of movable wires arranged in pairs for make-and-break contacts. The twin-wire subassemblies, or "blocks," may consist of 24 round wires molded at one end into a phenolic-resin plastic section, with welded contacts at the other. Assemblies differ in the number of wires needed for a particular application and in the position of the pairs of wires across the molded section. In the relay, one twin-wire block is mounted on each side of a stationary "single"-wire block—another type of assembly. This one consists of 12 relatively heavy wires, also molded into plastic sections but with different contacts welded to the opposite ends. These are stationary contacts made up of base-metal blocks with a precious-metal surface, 0.010 in. thick, welded on either or both sides of the wire depending upon contact arrangement.

For a wide range of combinations, it is necessary to provide a variety of these stationary and twin-wire assemblies. As a result, considerable flexibility is needed in tooling and machine setups as well as close control over processing tolerances.

Wire straightening

First step is accurate straightening of wire. Ordinarily, wire is received from suppliers on spools or reels and unwinds with a spiral bend—produced by the spooling operation or the capstan on the drawing machine. This bend must be removed to allow wire to be positioned for manufacturing and for proper functioning of the relay.

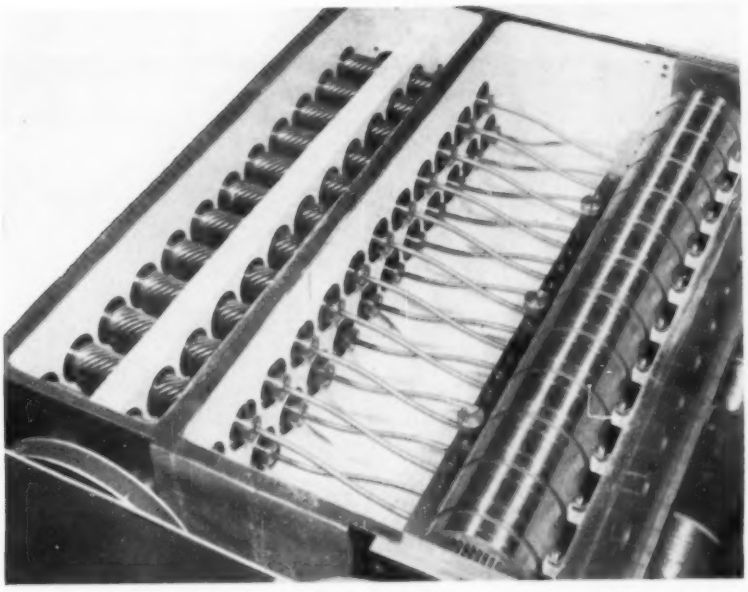
Special automatic, multiple-head straightening machines developed by Western Electric operate directly with hydraulic-molding presses where the straightened wires are formed and the plastic sections molded around them. Operation of straightening machines is intermittent and at a speed slightly greater than wire consumption of the molding dies. This has several advantages over the continuous straightening and storing of wire. Interrupting continuous operation of the straightening heads has no ill effect on characteristics of the straightened wire, and automatic control of the length of a partial loop of wire extending from the straightener assures an adequate supply. Ultimate length of continuous straight wire at the molding press is governed only by the length of raw wire on the spool and is enough for several shifts.

Both 24- and 30-wire double-head automatic straighteners have been built—the 24-wire machines for making blocks for so-called general-purpose relays and the 30-wire machines for blocks for multi-contact relays. The general-purpose relay requires two sizes of hard-temper nickel-silver wire —0.0226-in. dia for twin-wire blocks and 0.040-in. dia for single-wire blocks. Design of the straightening machine—for flexibility and maintenance—is essentially the same for either size wire, differing only in the contour of removable blades.

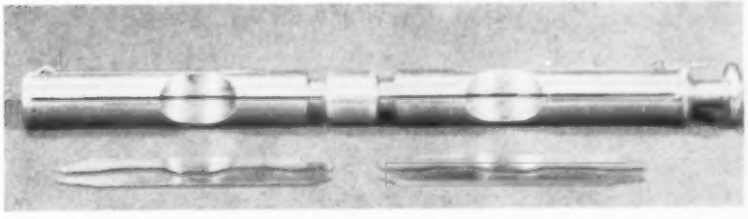
STRAIGHTENING MECHANISM

One spool of wire is cradled in the straightener for each wire required in a block. A capstan with an individual pulley adjustment for each wire pulls wire from the spools and meters the amount of wire fed into the straightener. Only occasional adjustment of individual capstan pulleys is necessary to insure uniform production from every head.

A power-driven shaft has a number of grooves equal to the number of spools (24 for a 24-wire machine, etc.) which mate with power-driven, spring-tensioned, twin-grooved wobble rolls to provide means for pushing the



DRIVE ROLLS in straightening machines push wire through tubes to two rows of straightening heads separated in the middle so halves can be rotated in opposite directions. Two spiral-geared driveshafts rotate each half of every head at identical speeds. Opposite twists in upper and lower wires are corrected by the double-head arrangement where the second set of heads rotate counter to the first



DOUBLE SPINDLES in straightening-machine heads are joined by a coupling, contain sheet-metal die blades instead of more conventional die blocks to cut costs and save space. The space between each pair of die blades clearly indicates the path of the wire during its transit of the rotating heads. When die blades are worn, they are discarded and replaced with a new set—usually when the spool of wire is replaced

wires through guide tubes to spindles in straightener heads.

Inside each double straightening head is a removable spindle with a free-coupled joint in the middle. Each bolt of the spindle retains a pair of contoured wire-straightening die blades. Die blades, made from inexpensive sheet metal on a punch press, are cheaper and take up less room than more conventional die blocks. Thickness of the die blades is slightly greater than the largest diameter wire to be straightened. A milled slot in each spindle holds the blade in place, guides the wire, and limits its sidewise movement just as grooves in individual die blocks would.

PHYSICAL PROPERTIES CHANGE

Wire travelling through the blades is flexed and burnished to produce the desired degree of straightness. It is not rotated during straightening, but may acquire twist and even a spiral thread-like burnished appearance from rotation of die-blade surfaces. This cold working under controlled conditions builds up sufficient stress at the surface to make the wire resist bending. The degree of straightness necessary, of course, is governed largely by performance required by the block in an assembled relay. For example, 0.0226-in.-dia nickel-silver wire in the twin-wire block may not deviate more than 0.010 in. from absolute straightness measured at the contact end of the comb, that is 2⅝ in. from its anchor point in the phenolic-resin block.

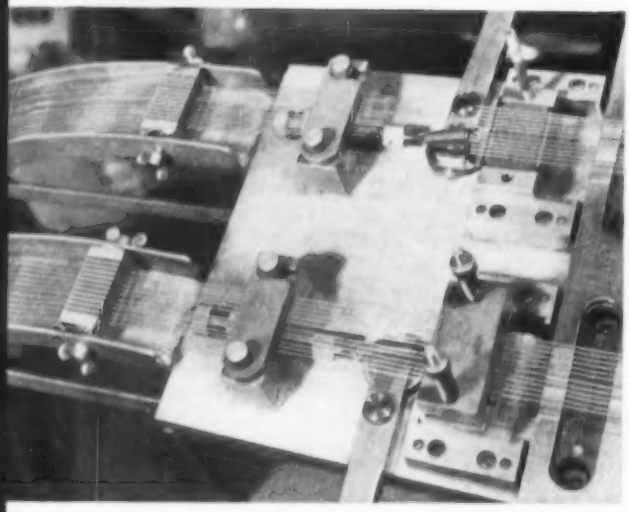
Physical properties of the wire change as the result of straightening. Tensile strength is reduced about 10% while elongation before rupture is increased around 50%. Surprisingly, diameter of the wire usually *increases* by 0.5 to 1.0% over that of the raw wire, with a proportionate loss in length.

Automatic molding

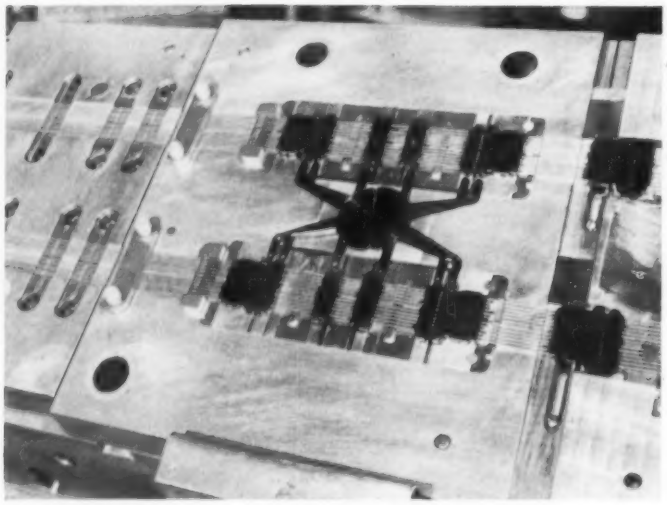
At each setup, progressive dies are installed in a hydraulic press to receive wire continuously as it leaves a straightener. First operation in each die is to serrate or flatten a short section of wire to provide a means of anchoring it in the molded-plastic sections. This prevents wire from turning in the plastic block after molding, thereby causing welded contacts to be mislocated later. Phenolic-resin preforms, previously briquetted in mechanical tabletting presses, are electrically preheated and automatically fed to the die at the second station. A feed mechanism conveys preforms from a magazine to an electronic heater, thence to the die, after the material has been sufficiently plasticized to permit a relatively short molding cycle. As one charge of compound is being molded in the die cavity, another is being preheated.

At the plastic-molding station, 4-cavity dies are arranged symmetrically about the center of the die block. Two forward cavities face the wire straightener, with the remaining two cavities in tandem. When a 12-wire single block is made, half the wires from a 24-wire, double-head straightener

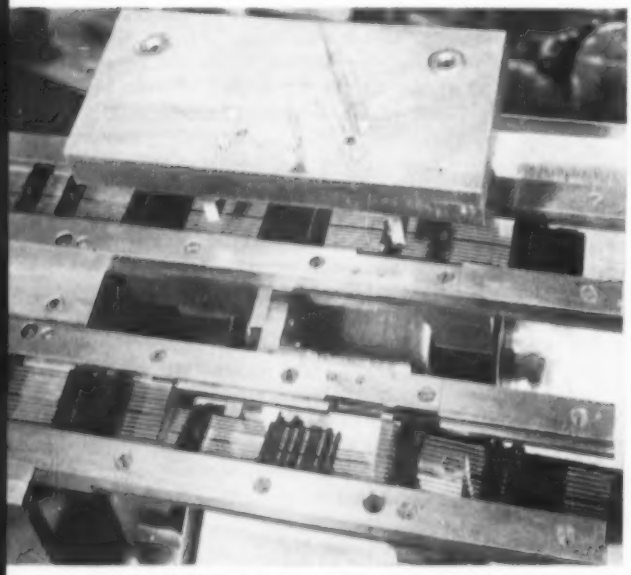
New tooling and techniques work wire...

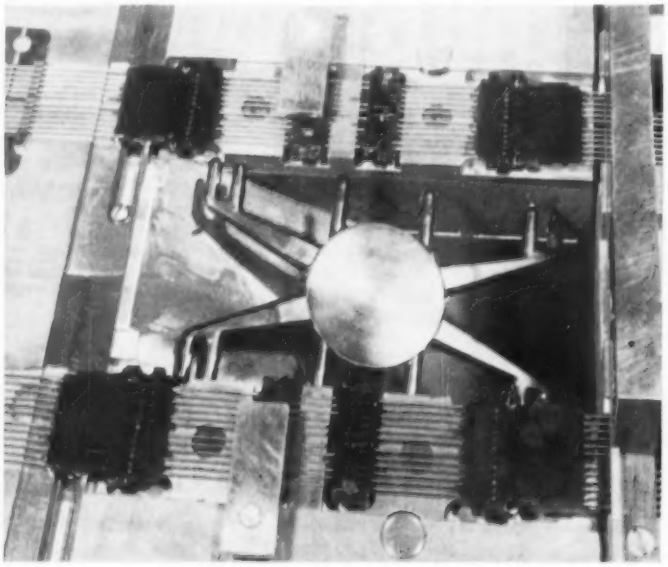


AUTOMATIC PROGRESSIVE DIE for making single-wire blocks guides 24 continuous strands of wire from the straightener with the precise spacing required. Spring-tensioned blocks hold the wires taut at all die stations. First station serrates sections of wire to be imbedded in plastic. Accurately spaced inserts press a series of notches in the wire each time the die closes. Subsequent indexing of the wire places the "anchors" in molding sections



ANCHORING THE WIRE IN PLASTIC is accomplished in four cavities arranged symmetrically around the plastic-transfer area where heated preforms are dropped before the transfer ram acts. This ram, heated by contact with the hot die, forces the resin through orifices and into the cavities. Heat of the die, (about 360 F) further softens the plastic so ram pressure forces it into intimate contact with cavity surfaces. Continued application of heat and pressure hardens the resin





FINAL DIE OPERATIONS are cooling, removing plastic cull, and shearing the wires. Cooling minimizes warpage of irregular shaped plastic sections and is accomplished by clamping the molded portion against spring-loaded steel pads that operate between water-cooled plates during the subsequent molding cycle. Closing the die also shears the cull, or waste material, which enters a chute for removal from the press. Cutting blades for shearing wire are tapered to cut each wire in succession to reduce the force required. Air-operated pistons index the wire forward each time the die opens

are guided into each forward cavity. When a 24-wire twin block is made, entire production of a 24-wire machine is guided into each forward cavity and two such machines are set up at each molding press. The 30-wire, double-head straighteners are arranged similarly when 15-wire single blocks and 30-wire twin blocks are made for multi-contact relays.

The four plastic-molding cavities, around the plastic transfer area, are fed by small orifices when the die is closed. A heated

preform is dropped in the center of this area ahead of a transfer ram which passes through the heated upper half of the die. Pressure of the ram and heat of the die, (about 360 F) forces the soft resin through the orifices and into cavities where the serrated sections of the wires have been located. Continued heat and pressure polymerizes the plastic, after which it is infusible.

EJECTION IS TRICKY

Automatic removal of the cluster of wires, plastic blocks, ram slugs and runners from the cavities is complicated in single-wire comb production because the plastic block at the contact end of the wires has very thin fin sections projecting into both halves of the die cavity. These fins, which guide mating twin contact wires in the finished relay, must be held to close tolerance and are extremely fragile. Spring-loaded ejector pins in the upper die half push down against the cured blocks to remove them from the upper die while retaining them in the lower half when the die is opened. These pins operate until the cluster is ejected from the upper half of the die. As the die closes for the next cycle, they are retracted by contact with reset pins which butt against the lower half of the die. Openings for ejector pins in the upper die also serve as air vents when the resin is entering the cavity. To prevent the resin slug and runners from breaking off and damaging the die on the next molding cycle, pressure of the transfer ram is maintained on the slug until the upper die surface is cleared.

The lower ram, with the lower die half, continues to withdraw until lower ejector pins can function. In addition to ejecting the plastic blocks, these pins guide wire inserts through the die and locate incoming wires in the cavities. After the molded section is removed from the dies and indexed to the next station, an air blast removes any loose flash.

CLAMPING CUTS WARPAGE

Geometry of the plastic blocks tends to make them warp easily as they cool. For this reason, the next station has spring-loaded steel pads between water-cooled plates so the plastic-embedded wire assembly can be clamped and held in position while the die is closed during the next molding cycle. Closing the die also shears the cull, which is then conveyed down a chute for removal.

A locating stop is built into the die at this section, too, to establish proper spacing for inserting new wires through the die when new spools are started. The stop can also be used as a check at any time to be sure parts are being indexed the proper distance.

Final operation is shearing the wire in the molded assembly to form individual blocks. To reduce force required, cutting blades are tapered to shear each wire in succession. Afterwards, the ends are cut again to insure precision lengths. Individual combs fall free of the guide rails into chutes leading to the front of the press to complete automatic molding.

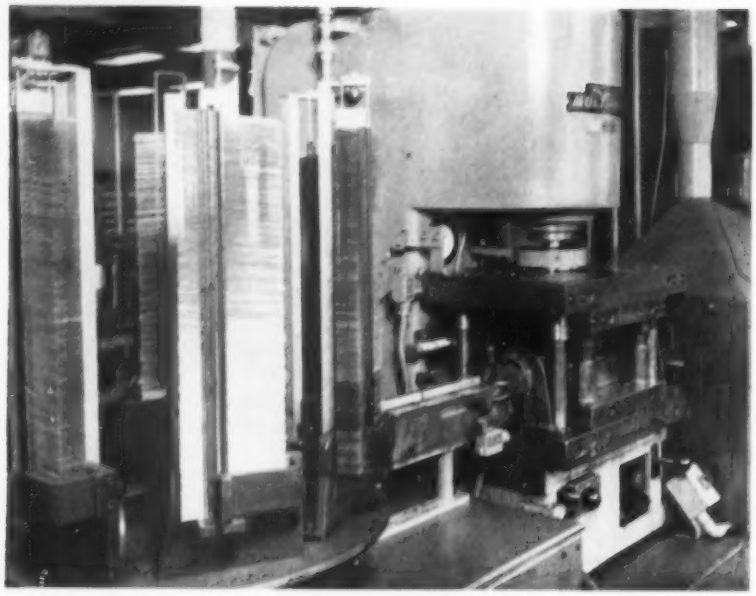
Final operations are automated

Flash removal in special Pangborn grit-blasting units with automatic conveyors is the next step. Operators load blasting fixtures specially designed to protect fine molded teeth on the plastic sections while exposing flash areas. These are placed on a conveyor for transfer through the machine, where ground walnut shells blast the ash away. At the exit end, fixtures are manually unloaded and replaced on the conveyor for return to the loading station. Blocks are placed in special slotted magazines for transfer to subsequent operations and are not handled individually again.

Forming contact ends of wires, degreasing, welding contacts, coining contacts to specified dimensions, forming the terminals, clipping the ends to length, tension bending the wires, and removing unnecessary wire are all done in lines of machines through which parts are transferred and processed automatically.

Critical dimensions in the relay and the manner in which components are assembled govern the way parts are located at work stations in the automatic transfer lines. In the assembled relay, a single-wire block is located between two twin-wire blocks. Dowels, molded as part of the plastic single-wire blocks, enter locating holes in each of the twin-wire blocks to simplify assembly and hold the three components in alignment. All contact-locating dimensions are measured from

AUTOMATIC GRIT BLASTING removes last traces of flash from molded sections of wire blocks. Special fixtures which protect fine teeth are loaded onto conveyors that carry them through the blasting machine. After being blasted with ground walnut shells, fixtures are unloaded and conveyed to the loading end for re-use. Finished work is placed in special slotted magazines for transfer



AUTOMATED FORMING AND WELDING LINES are set up for both twin- and single-wire blocks—differ principally in the type of welding employed. Twin-wire line shown employs a transfer shuttle to carry blocks from one setup to another—begins on an indexing table that loads the shuttle for transfer through forming, clipping, cleaning, contact welding and coining. The last transfer restacks completed sub-assemblies into magazines, ready for assembly into relays

these dowels and holes and, at each station, they are used for precisely locating parts before an operation is performed.

Some differences occur in processing to produce different types of blocks, but except for details such as twisting the ends of wires or the welding operations, processing in each line is similar. Contacts on twin-wire blocks, for example, are automatically multiple - resistance - welded, while those on singe-wire blocks are joined by percussion welding.

All three lines employ shuttle-type transfer rails to move work from one machine to another, and each line is equipped with controls that permit several machines in a group to be run while others are down. At the beginning of a twin-wire block line, for example, cleaned parts from the molding room are loaded into turret magazines on a 6-station indexing table —about 150 parts in each station. The transfer rail pulls out the bottom block at one station, positions it on the track and returns for another. When the last part in the track is removed, the turret indexes to the next position until all six have been employed. The transfer slide then carries the work to an 8-ton Denison Multipress equipped with a 3-stage progressive die for forming, flattening, and clipping the wire ends. The second stage in this die performs the most complex wire-forming operation in the line. Here the contact ends of the wire are formed and flattened preparatory to welding the contacts. A double-bend similar to the letter Z is produced and the tips are flattened and curved on one side to form the base for the contact. The opposite side is flattened to make a low-resistance surface for contact welding. Next transfer carries the blocks to a cleaning station where all traces of dirt and oil are removed from ends to be welded. At this station, wire ends pass through a curtain of liquid trichlorethylene, then are air dried.

Automatic welding

The most interesting setup in the twin-wire block line is the multiple resistance - welding station where contacts are cut into small, precise, blocks from strips, or tape, made of 0.009-in. thick palladium with a 0.001-in. thick layer of 22-kt gold fused to the top surface. The bottom surface has a small bead which constitutes the projection for welding. This bi-metal tape, about 0.030 in. wide, is fed to the machine in long lengths from individual reels.

Wire blocks are automatically transferred to the welder from the left and are located much as they were in the first press. The welding head includes 12 electrodes—one for every other wire in a 24-wire block. A second identical head handles remaining wires. After the block is positioned and wire ends precisely arranged over a single lower electrode that accommodates all of them, individual contact tapes are advanced 0.050 in., with the ends positioned over the wires that are to receive them. Individual cantilever-suspended electrodes descend and press tape ends firmly against flattened surfaces of the wires and the weld is made. Tapes are then clipped and the part transferred to the second head where the process is repeated on remaining alternate wires.

Versatility is required at this setup because of the many combinations of contacts. When a particular part doesn't require contacts in all positions, none are made—and, of course, no precious metal is used. All 24 circuits in the welder are independent, and the desired pattern is pre-set with a bank of toggle switches. Movements to transfer and locate the part, operate the electrodes, feed, clamp, and clip the tape, are all controlled by a master camshaft, thus kept in precise timing throughout the cycle.

Presses and press tools

After contacts are welded to wire ends one of the most critical press operations is performed in a 15-ton press with a single-station die —directly under the ram to minimize distortion. Here critical con-

tact location is established within plus or minus 0.002 in. by coining, which also provides a smooth, curved surface. At the same time, wires are squeezed beyond the contacts to make a smooth, flat surface to rest on an actuating card.

At the next station, an 8-ton press with a 2-station die is employed to complete terminal ends of the blocks. Pairs of wires are offset here into staggered rows to simplify connecting at assembly, and ends are evenly clipped. The last press is also of 8-ton capacity and is equipped with a 2-station die. The first station forms an offset bend in each wire so relay contacts will press against each other properly and with required force. The second station in the die clips off any wires not to be used for the particular kind of relay being run. This tool has a series of twelve shears which can be arranged quickly to clip according to any desired pattern.

With the reciprocating transfer feed to these presses, positive alignment of the transfer bar with all tools is essential. As a result, double diesets are employed at each press—one within another. Each outer dieset locates and supports a section of the transfer bar and is permanently installed in the press. The inner dieset contains working tools and is mounted on dowels within the outer dieset.

Final station in the line is unloading, where an 8-station magazine turret receives finished parts from the transfer mechanism. As each magazine is filled, the turret indexes to present an empty station to the unloading device. When six or seven magazines are filled, an operator removes them and attaches empty magazines to the turret.

Percussion welding

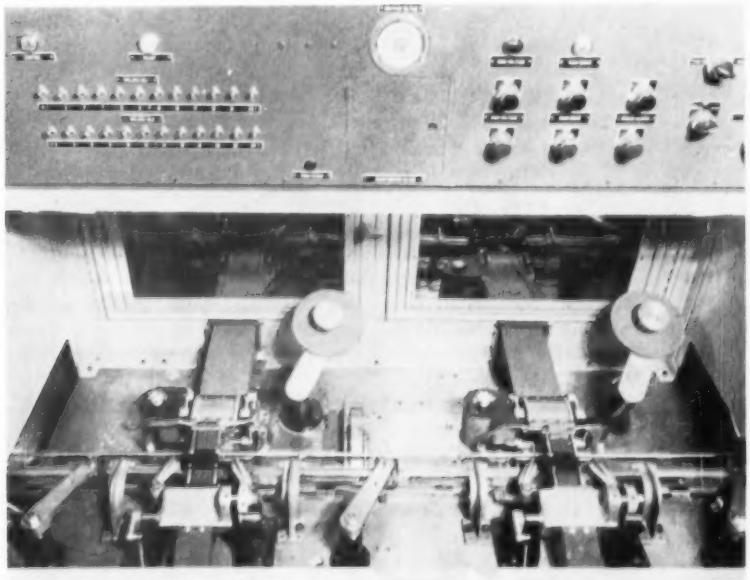
Final operations on single-wire blocks are automated too, much the same as those for twin-wire blocks. Contact welding, however, is entirely different in that percussion welding rather than resistance welding is used. Design of the wire block is such that clamp electrodes, normally applied in resistance welding and located near the weld zone, cannot be used. Contacts are small, rectangular blocks of cupro-nickel with a 0.010-in.-thick layer on one or both sides. These are butt welded to wire tips in various combinations.

Percussion welding involves application of a high potential—900 to 1800 volts—across a gap between the parts as they move toward each other. The resulting arc heats abutting surfaces before they meet so a thin layer of metal is brought to welding temperature, the weld being made as the parts come together with an impact. Accuracy of location and high weld strength are obtained, together with high speed. In addition, only a small amount of metal is heated, thereby reducing the heat-balance problem.

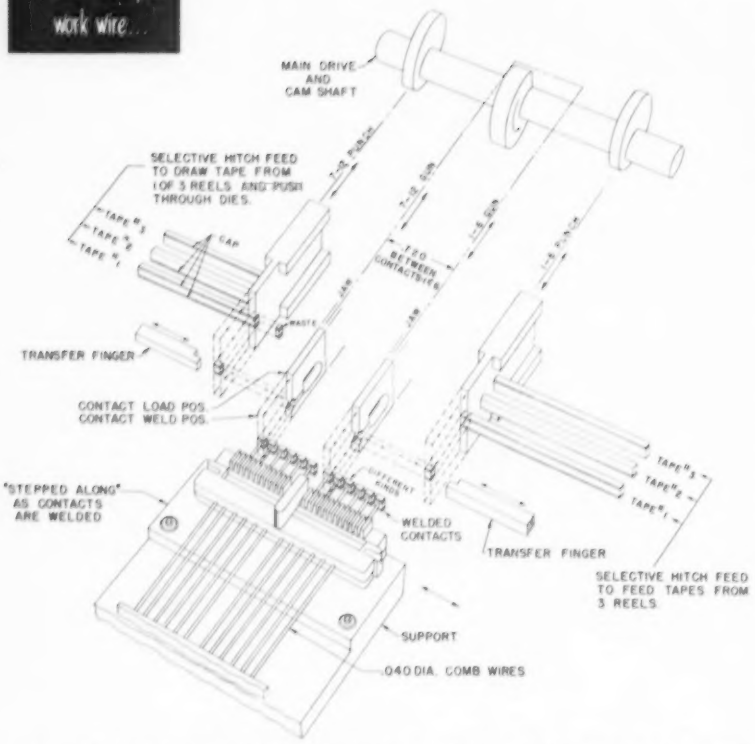
Four contact conditions may be applied to each wire. For a "break" contact, the palladium cap on a contact is down; in the "make" it is up. For transfer, or sequence contacts, palladium caps are required on both upper and lower sides; and where no contact is required, of course, none are joined to the wire. All top paliadium contact surfaces must be located in the same plane across 12 wire positions of the block within a tolerance of plus or minus 0.002 in. Three reels of tape are fed to each of two duplicate welding heads, one on the right, another on the left. Selector knobs are provided at tape-feed cams so one of the four conditions can be pre-set for each wire position of the block. The welder automatically selects the type of contact needed, cuts it from the tape and welds it to the end of the proper wire.

WELDING IS STAGGERED

Two contacts are welded, one on each side of the block, with each revolution of the drive shaft. After revolution, the block is indexed to the next pair of wire centers. Six revolutions complete the welding of 12 contacts, or fewer if required. To prevent electrical or mechanical interference, there is an interval of one degree of revolution of the carriage main shaft between the firing points so guns



24 CONTACTS CAN BE WELDED SIMULTANEOUSLY to the tips of twin wires in this automatic multiple-resistance setup. Bank of switches at upper left can be pre-set to weld any desired contact combination. Two heads handle alternate groups of 12 wires in the 24-wire twin blocks, each head having 12 electrodes. Contacts are small pieces of palladium and gold cut from tape automatically fed to the wire ends



AUTOMATIC PERCUSSION WELDING of contacts to single-wire blocks is handled in a special machine designed to select two of six palladium tapes, cut a contact from each and weld them to two wires in one cycle. Selection of the tape is especially important because there are four different contact conditions (none, top contact, bottom contact, both), necessitating three reels of tape on each side of the machine. Selection knobs on both right and left tape feed-cams are set for one of the four tape-feed conditions for each wire position of the comb. Thus any combination of contact conditions can be set up to make parts for any type of relay

do not weld at exactly the same time.

The three tapes enter a shearing die through individual openings, but only the tape chosen by a selector is fed into the die and sheared by the punch. Punching action was developed to avoid dragging base metal over the boundary line into the palladium zone, thereby avoiding contamination of the precious-metal surface. As the contact is sheared, a notch in the punch confines the palladium-surfaced sides to prevent distortion. At the end of the shearing stroke, the punch delivers the contact to a transfer finger which pushes it out of the notch through a guide channel and into the gun jaws.

Jaws receive the contact block through openings a few thousandths of an inch less than the height of the contact. Openings are bevel-edged so they spring open when the contact is pressed against them—and after its entry hold it securely in place. After welding, the gun retracts and jaws are stripped from the contact. At the extreme end of the return travel of the gun, any insecurely welded contact that might remain in the jaws is removed by an ejector blade to make room for the next contact.

During welding, the comb must be supported accurately and securely to meet close contact location requirements and to withstand impact of the guns.

Each weld circuit includes a capacitor which is charged during a small portion of each cycle and subsequently discharged through a resistance in series with the weld. During the charging period, which is controlled by a cam and miniature precision switch, contact and wire end of the comb are separated electrically at the weld point. A multiple-leaf brush under considerable pressure connects one side of the circuit to the terminal end of the individual wire being welded. The gun, together with the contact block, is connected to the other side of the circuit. At the instant a cam frees the gun, a spring propels it toward the wire and an arc is initiated when the gap has been reduced to a few thousandths of an inch.

A portion of the abutting surfaces of both wire and contact base metal (normally 0.005 to 0.010 in.) are melted and expelled in liquid and gaseous states before the molten surfaces are forced together. The arc is extinguished when it can no longer melt and expel metal to maintain a gap. Under good operating conditions, it lasts for 0.1 to 0.4 milliseconds. Nearly all of the heated metal is expelled from the joint during welding so a joint layer of only 0.001 to 0.002 in. thick is melted or heated sufficiently to change the grain structure of the metals. A small stream of compressed air is directed into the weld area to prevent gaseous arc products from interfering with initiation of the arc during the next weld cycle.

Life of gun jaws is dependent upon many factors—one of the most important being the prevention of accidental arcing directly to them. Each set of jaws is so adjusted that they will not touch the wire end and thereby discharge the capacitors if no contact is in the jaws. A safety circuit to prevent damage to the jaw includes miniature precision switches which excite thyratrons to discharge the capacitors when a contact fails to feed properly or a block is improperly nested. Signal lights are also provided to indicate such conditions to the operator.

Protection of personnel from high voltage is provided by enclosures, door switches, solenoid-released shorting bars and bleeder resistors on capacitors. Safety from mechanical jams is provided by a slip clutch on the main drive gear and by a pull-out clutch and automatic stop switch in the block-transfer mechanism.

Development Corner

"I just had an argument with Harrison about this development work we're doing, Al. As usual, I didn't get anywhere."

"What's the trouble, Ed?"

"Well, they've got Hanson over in the corner there, working on new ideas and new materials. The trouble is that he's still under my budget, and Harrison won't give me another man to replace Hanson because he claims Hanson is only working part time on development work."

"Isn't he?"

"Hell, no! I haven't gotten a speck of work out of Hanson for four weeks, now; and Hanson's getting a swelled head because I can't control him any more. If he's working on a development job for somebody, he just tells me he's got to finish it first."

"Maybe you could switch somebody else to the development work, and put Hanson back on his regular job."

"That's not the real answer, Al. I want Harrison to establish an experimental department and take Hanson off my budget. He's wasting my time and production space with his fooling around, and I'm not getting a bit of return out of it. If they had an independent department for new developments, then I could get a replacement for Hanson and get back on schedule."

"Why don't you take it easy for a while, Ed? I think that arrangement is only temporary. If they get anything good out of Hanson, they probably *will* set up a new department. If they don't, then they'll probably give him back to you."

"That's leaving too much to chance, Al. I need help now. If they have to take one of my more experienced men, the least they can do is replace him."

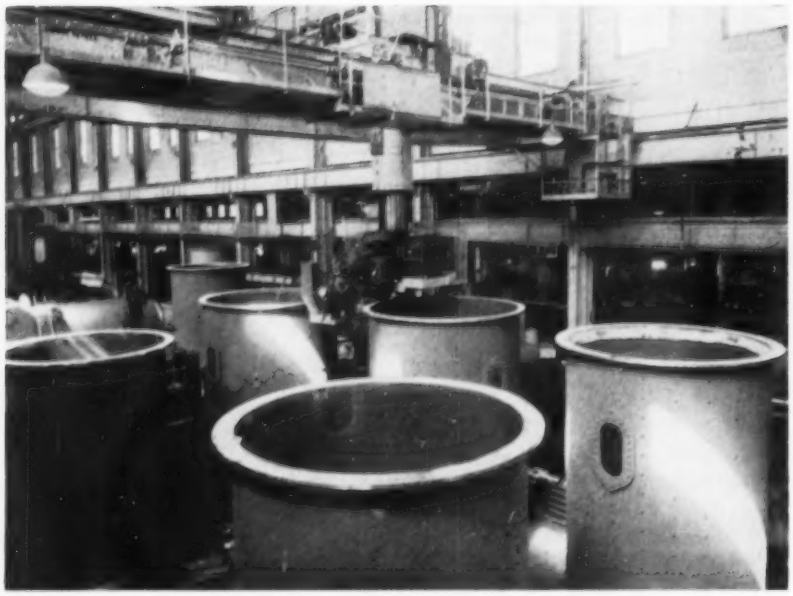
"Did you ever try to win an argument with Harrison, Ed?"

"I just tried half an hour ago. That's why I'm so mad—there's nothing I can do about it."

"Then all you can do is sit tight, Ed."

"That's the trouble, Al. Harrison won't believe I need more help until I get so far behind schedule it would take an extra three men to get me caught up."

SHOULD ED KEEP AT HARRISON *for another man, or should he sit tight and wait until Harrison realizes there really is a need for more help? Is Ed's idea about a new experimental department sound? Your ideas on the subject may help others. Discussions of earlier topics start on page 164.*



THESE 11-FT OD, 17-FT-LONG WELDMENTS (ball-mill shells) are set on shop floorplates and drilled in quick succession with crane-supported unit to scribed layouts. It isn't even necessary to clamp the large workpieces to the floorplates. A small air compressor and cutting-fluid tank at the rear of the operator's platform provide mist coolant for cutting tools

"Skyhook" supports radial drill

Working area of 52 ft x ¼ mile, from 5 to 20 ft over the shop floor—that's the result when Allis-Chalmers mounted a drill head and arm on a special carriage built into the bridge of an overhead crane. Over-all savings are at least 50% on the big jobs

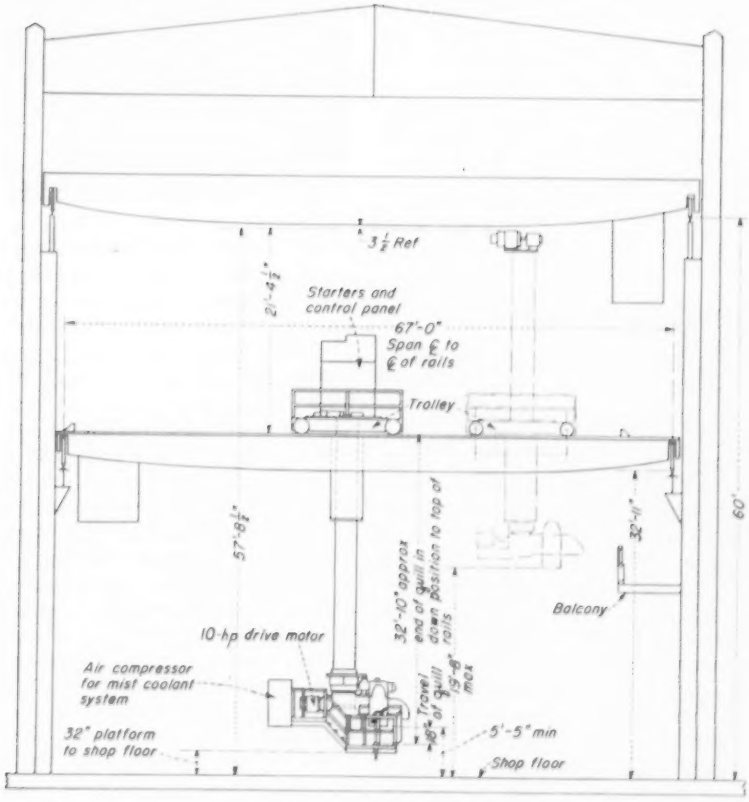
RICHARD F THUMA
superintendent, tools & maintenance section,
WEST ALLIS WORKS, INDUSTRIES GROUP,
ALLIS-CHALMERS MANUFACTURING COMPANY

Standard practice on large work, such as hydraulic turbines, has been to set them up on floorplates and to bring radial drills to them. Four years ago, it was first suggested that a radial drill might be supported by a crane. Everyone in management at West Allis Works, plus the Tools & Maintenance Section, has cooperated since in developing the idea, and 18 months of design and construction work went into it. But now, the crane-supported radial drill (see cover of this issue also) is a working actuality in the main erection shop, and has already proved its value.

Head and slightly modified rail arm are from a conventional 4-ft-arm, 15-in.-column radial drill with capacity of 3-in. holes in mild steel and 4-in. holes in CI. Quill movement is 18 in. This unit is mounted on a 15-in.-OD extension on the bottom of a 30-in.-OD, 30-ft-long CI column in a special carriage on a 67-ft-span overhead bridge crane 32 ft, 11 in. above the shop floor. The column is vertically adjustable by a 3.530-in.-PD, ½-in.-pitch, double-thread leadscrew driven by a 40-hp dc motor at speeds to 116 ipm. The carriage can be traversed at speeds to 246 ipm by a 2-hp motor, and the bridge is moved by a 30-hp motor. Everything is controlled by the drill operator from his platform at the drill head, and protected by limit switches and interlocks.

Two levels for cranes, plus the ready maneuverability of the drill, avoids interference with regular hoisting problems. Operation has been entirely satisfactory. No problems have developed from vibration, either from operation of the machine itself or from movement of adjacent cranes. Chatter has occurred only when an incorrect combination of speed and feed has been attempted. The machine has drilled 1⅞-in. holes in steel weldments at 202 rpm with 0.022-ipr feed, 2¼-in. holes in steel at 168 rpm with 0.017-ipr feed; and 3-in. holes in CI at 168 rpm and 0.022-ipr feed. It has bored 5½-in. holes in steel with a conventional flycutter.

ALL MOVEMENTS OF DRILL HEAD, its supporting 30-in.-OD, 30-ft-long CI vertical column, carriage and crane bridge are controlled from pushbutton panels beside drill head in front of operator on platform. Electromagnetic brakes lock elements when head is positioned. Operator is protected by safety belt. He is shown drilling 570 bolt holes in flanges of 12 x 24-ft steel waterbox for a steam condenser



DESIGN WAS WORKED OUT carefully to insure clearance under cranes working on 60-ft-high upper rails, even when vertical column is raised to upper limit. Special carriage on crane bridge, with all supported equipment, weighs nearly 40 tons, so does not require clamps to resist thrust of machining

PUSHBUTTON AND SWITCH PANELS beside radial-drill head control all movements of crane-supported machine. Dc motors and controls are used, and cables brought down through hollow CI support column connect controls and motors on movable platform with carriage on crane bridge. Limit switches and interlocks prevent movement of head, column, carriage or crane bridge beyond preset distances

Practical Ideas . . .

Sports Clock Records Working Time

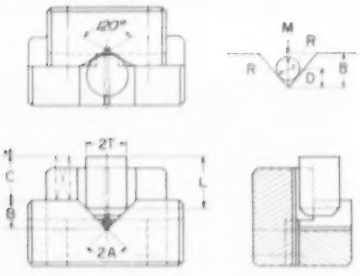
One of the specializations in our shop is oxy-acetylene spray metallizing. Because we charge by the minutes the gun is in use, besides the machinist's time, we had difficulty getting the actual time the operator was using gun.

We solved this problem by installing a spring wound time clock, of the kind used to clock football and basketball games, under a pressure switch, actuated by the fluctuations of the air pressure.

With the clock set at zero, it is started by the switch the moment gun is turned on because of the drop in line pressure. And the moment the gun is turned off, the resultant sudden pressure buildup causes diaphragm of switch to press down on the clock's stop button. Thus the clock records every minute of operating time.

Harry Miller, Sarasota, Fla

Simple Trig Finds Chamfer Height



On some parts we make, such as chamfered core pins, we have to hold close tolerances on the length of chamfer; which means we must measure it somehow. It can't be done directly; but if we can find the length of the straight section of the part and subtract it from the overall length, we will have the vertical height of the chamfer. Then we can convert it to a slant height, if necessary, by multiplying by the secant of the chamfer angle.

Our equipment for finding the length of the straight side needs two V-blocks, as illustrated. These nest together to hold the work exactly vertical. The vertical block has a 120° included angle to hold the work, while the horizontal block is machined to the chamfer angle, whatever it happens to be.

First, gage blocks are used to measure to the top of the work, dimension C. Then the work is removed and a bearing ball is dropped into the V. With a depth gage we measure from the surface of the block to the top of the ball, which gives us dimension M. We also measure the ball, to find R (radius). Then we calculate depth as follows:

D = R Csc A (half the chamfer angle.

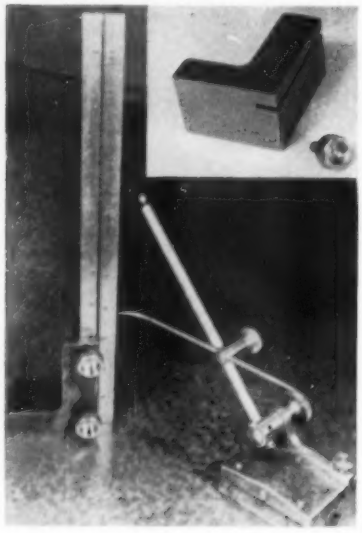
B=M+R+D

S, the dimension from the bottom of the V to the top of the chamfer, is T Cot A.

Now, to find L (length of straight section):

L=C+B—S

Charles Minaire, St Etienne, France



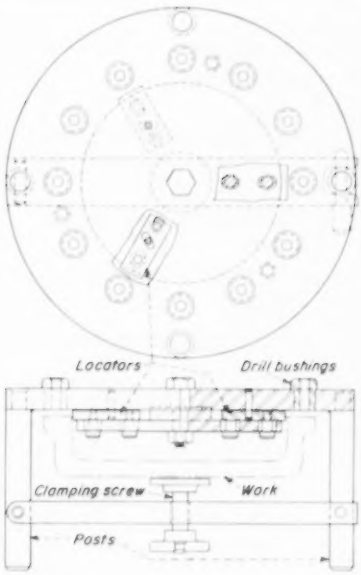
Scale Holder For Layout Work

In layout work, where height-gage accuracy is not a requisite, a combination square scale will do fine. However, many have found that the combination head does not provide a good base for standing the scale on end. The scale may topple over at the slightest vibration.

The illustrated scale holder is easy to make. We used machine steel bar stock in its construction, holding no particular dimensions, except the slot vertically milled should be slightly wider than the thickness of the blade. Two holes are drilled and tapped into this slot to receive a pair of knurled thumbscrews, which lock the scale in position.

The lower end of the blade should be seated firmly on the surface plate before screws are tightened. All measurement will then be taken from the base surface.

H J Gerber, Stillwater, Okla.



Centralizing Fixture Is Adjustable

The principle of this centralizing fixture can possibly be adapted to many other jigs and fixtures where self-centralizing is a factor. The fixture shown consists of three locators, machined to suit the inside contours of the castings. These locators are moved in a straight line from the center by the movement of the centralizing plate. Alignment is maintained by two shoulder screws on each locator, with clearance giving them freedom to move along the slot in the centralizing plate.

Each locator has a slot machined at 45°, with a sliding fit for the pins in the top plate.

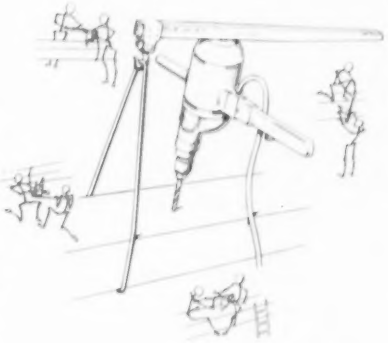
The underside of the top plate is counterbored to suit the boss on centralizing plate, to maintain concentricity under pressure. A special screw is made, its round section a running fit in the top plate, and the shank fitted into a square hole in the centralizing plate, with a locknut at the bottom.

We use it in the following manner: The casting is loaded into position after locators are backed off. The clamping bar is then locked in place with light pressure on clamping screw. Fixture is then turned over on its four posts. The operator centralizes the casting by turning hexagonal screw-head in center of fixture clockwise. The locators are thus brought to bear on inside of casting. All that remains, before actual drilling begins, is to tighten clamping screw on the bottom.

Alex S Arnott, Toronto, Canada

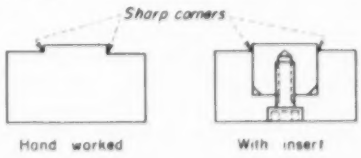
Heavy Drilling Is Safer With Helper

Using a large portable electric drill can be both backbreaking and dangerous, especially when drilling large-diameter holes. It was for this reason we made the illustrated helper. We get the necessary leverage without exertion, and at the same time, we have steadiment for the drill. This is particularly helpful in limited space.



A strong wood slat and a length of rope are all that are really needed. We put a hook on the end of our slat because we use it quite often, and the hook makes it easier and faster to use. If the rope has a loop in one end it will make tying easier.

Tsagunosuke Kikuchi, Kyoto, Japan



Getting Sharp Corners On Gages

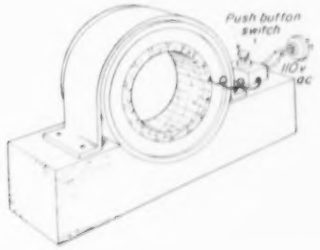
Making Go-No Go gages is part of our production. The invert corners always gave us the most trouble, for they had to be hand finished to get a really sharp inside corner.

The illustration is kept simple to show a typical application, and the way we eliminated hand work by the use of an insert.

The insert width is made to size, and a few thousands added to the height. Main block is then machined to dimensions, with a slot to take the insert snugly. After block has been ground on the bottom and two sides, it is ground on top, with an extra cut 0.001-in. deep taken on the right side to establish our limits. The bottom of the slot is ground at the same time to provide good landing for the insert.

The bottom corners of the insert are relieved for clearance before it is placed in the slot, where it is held by socket-head capscrews. The gage is then finished by grinding the top of the insert to its proper dimension.

George G Herzl, Philadelphia, Penn



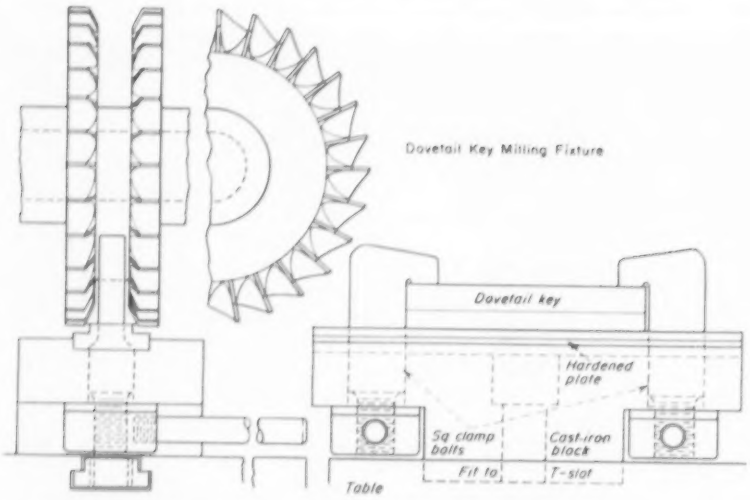
Motor Field Coil Is Good Demagnetizer

We needed a demagnetizer in a hurry. The nearest thing to anything electrical was an old broken-down fractional-horsepower motor. After finding the field coil in good order, we pulled it out and mounted it on a 4x4-in. wooden block, for the housing was also broken. It was held in the block by a single sheet-metal strap, bent around the field laminations, and fastened on each end with woodscrews.

To safeguard against overheating we used a single-pole push-button switch.

Electrical plastic tape was used to line the coil interior as a protection for the wire coils and for safety.

Paul L Sterner, Los Altos, Calif



Another Dovetail Slide Setup

I read with a great deal of interest your article on dovetail slide production (AM—Feb 13 '56 p 164) but could not help wondering how many shops are equipped with double-spindle milling machines. It was this question that prompted me into sending you my method of turning out the same product.

I use an ordinary horizontal milling machine with two side-milling cutters, altered to produce the dovetail angle wanted. A spacer is placed between the cutters, the thickness of which must be the same as the finished key.

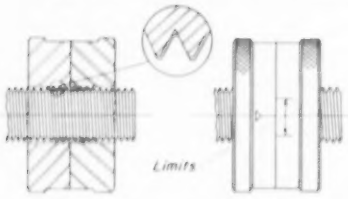
The body of the fixture shown is cast iron or steel. It has a tongue on the bottom to fit a slot in the table. A hardened strip of steel is inserted on top to prevent compressing the metal under the key being machined.

Two cutouts are machined for the clamping nuts and washers. The two clamps have square shanks, so the clamp holes must be squared to hold clamps parallel.

The round nuts are each provided with a handle. Best location for these handles may be found by tightening the nuts with a key blank in place and then marking off the most convenient place. Or several holes may be drilled and tapped, if there is a chance that the thickness of the blanks will not all be the same. Nuts should be made to fill the space between block and table to raise clamps from key when loosened.

H Green, Winter Park, Fla

Gage Checks Male Threads



Checking male threads with a standard nut may be good enough for most applications, but where tolerances are closer than you care to trust to "feel," this gage can be your answer.

The idea is to check the effective pitch diameter by means of two ring gages with outside and root diameters slightly oversize.

A zero line is engraved on one gage, while two lines, representing upper and lower limits, are engraved on the other. These limit lines are easy to establish with a master male gage.

G J Richards, Surrey, England

(Note: Mr Richards doesn't say how the gage is machined, so we assume the butting faces are precisely perpendicular to the bore, and best machined together, in one setup.—ED)

Winner No. 252

H J GERBER
GEO OLIVER

won $25 in addition to regular payment for their ideas:

SHORTCUT ON TOOLPOST ROCKER

FLYCUTTER CUTS DOWN CHATTER

in the issue of June 4, 1956

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

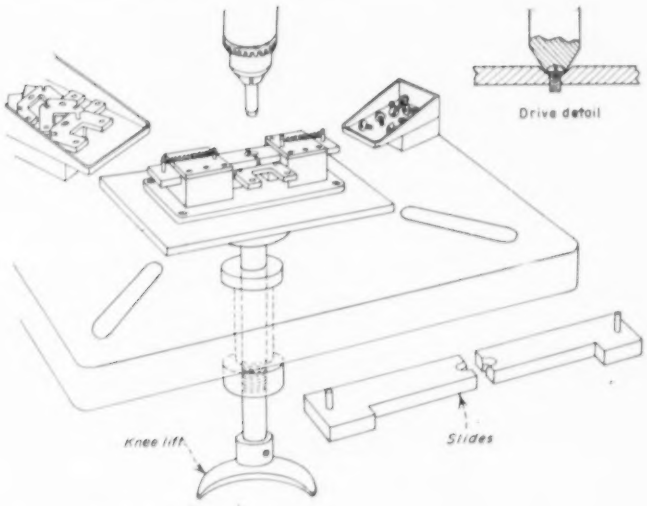
PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer, or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER—Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N Y



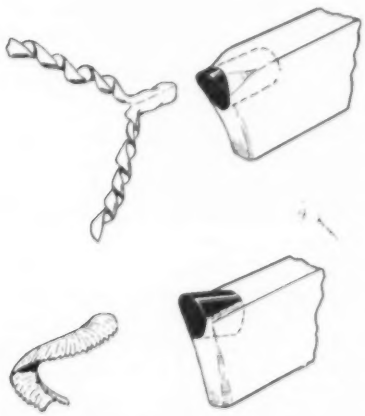
Spring Slide Guides Screw In Drillpress Assembly Fixture

Many automatic hopper-fed assembling devices are on the market, but all are costly. If your production is not in the large-output class, this fixture should serve nicely.

It is used in a drillpress and is mounted on a headplate. The nested parts and the screw are set manually and then brought up against the driver by the knee action of the operator. As the screw is tightened the slides move out of the way. Thus the operator has both hands free for assembly.

The nest should be fitted so the parts are accurately guided when placed in position. A good policy might be to use inserts and thereby broaden its capacity.

Charles H Willey, Concord, New Hampshire



Round Carbide Tools Show Improvement

I have been experimenting for many years in search for a better toolbit. The standard carbide-tipped toolbit would always give me a tough time in corners, because of chattering. Plunge cutting was next to impossible for the same reason. After long runs, chips would produce cratering and eventually burn the cutting edge.

The tool I use is simply a round piece of carbide. When first put to use it is long enough to clamp in a holder made for it. But after it has been ground down so it can no longer be held that way, the remainder can be silver-soldered to a suitable bar of machine steel. The illustration shows two such adaptations, one with positive rake, and the other negative. Two types of chips are also shown; top is chip resulting from plunge cutting, bottom is the result of side cutting.

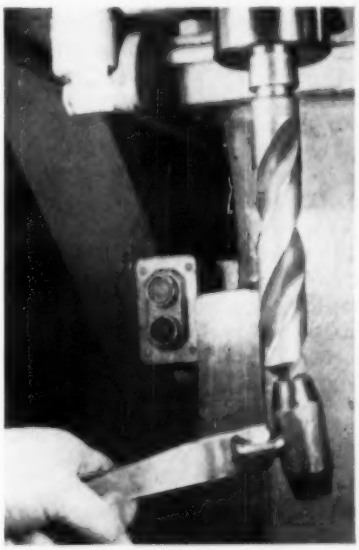
Turning operations, whether longitudinal or crossfed, are successful with this tool. It will produce a curved chip that falls off before it becomes annoying; thus acts as a chipbreaker. (See lower chip in illustration.) It works equally well on tool steel, bronze, and cast iron.

This tool will actually make a clean chip on cast iron, instead of the usual dust formed by standard methods. That in itself will make it worth while.

I have been turning out such work as V-belt pulleys just to give an example of plunge cutting, and have had no trouble with chatter.

The tool can be ground to any form desired, but top of tool must remain round and polished.

William Maurer, Queens Village, NY

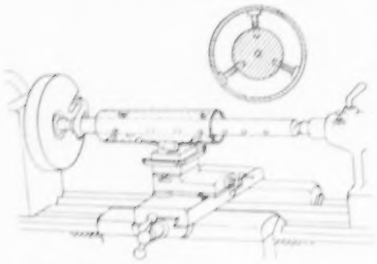


Head on Drift Makes It Utility Tool

Mounting a soft copper head on the broad end of a drill drift makes it a handier tool to have around a drillpress. In seating all tapered-shank tools that are used there; drills, reamers, boring bars, and spotfacing tools; it is safer to use, for it won't chip or mar the cutting tools. It will also add some weight to the drift so one-hand removal of seated tools is often possible.

A threaded stud is slotted and welded onto a standard drift. A soft copper head is made and fitted to the stud. After the stud is screwed tightly through the head it is peened over to lock it in place. Brazing head to stud, instead of peening, is also satisfactory.

H J Gerber, Stillwater, Oklahoma



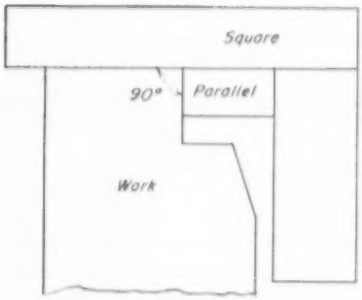
Chucking Mandrel Holds Tubing

Tubing and pipe of considerable length can have both ends faced perpendicular with ease on this mandrel. After work has been set up to run true, which can be done by adjusting the jacking screws, both ends are faced and readily measured with a micrometer or vernier caliper.

The mandrel consists of a length of shafting centered at both ends. Machining the OD is not necessary. Three holes are drilled and tapped, 120° apart, a few inches from the end. In the other end, a series of similarly spaded holes is drilled and tapped to accommolate different lengths of tubing. Other length capscrews will permit a variation of diameters to be faced.

Once a setting has been found, only one screw at each end has to be loosened to allow removing or replacing of tubing on production runs. A standard lathe dog drives the shaft.

Phil McCafferty, Stanwood, Iowa

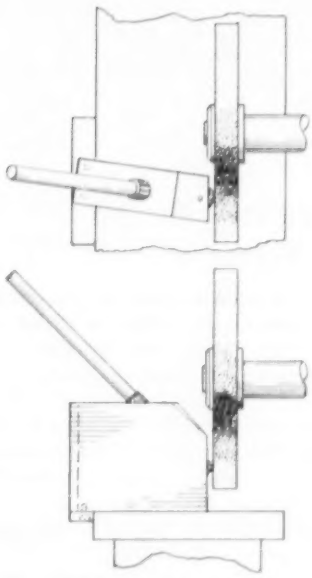


Recessed Angles Checked With Help Of Parallel

When angles in recesses must be checked, and the shape of the workpiece is such that no part of the precision square can be introduced, the checking can be done indirectly.

The illustration suggests how this is done. A parallel is made, rectangular in this case, with all sides precisely perpendicular, since the angle to be checked is 90°. However, this method can also be employed in checking other angles. You simply grind the surface that is to bear on the work to the angle wanted.

Frederico Strasser, Santiago, Chile



Fixture Helpful in Sharpening Reamers

Many small shops cannot afford the luxury of a tool grinder. It is therefore difficult for a man to keep his reamers sharp.

Because the cutting action of a reamer takes place at the beveled end of each flute, these corners dull and need resharpening.

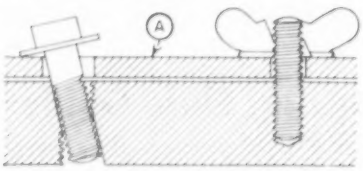
In order to get a good cutting edge on our reamers, we decided on the illustrated fixture. After squaring a block of steel big enough to take a particular size reamer, we drilled and reamed a hole at 45° to the base, leaving a lip at the bottom so only a corner of the reamer will protrude.

We drilled a small hole at right angle to the reamer, and pressed in a pin only far enough to enter the reamed hole. This acts as indexing pin for the reamer.

A plate is fastened under the fixture, on the back end, at an 8° angle. When the fixture is placed on the magnetic chuck with the plate against the edge, it will then be aligned for proper clearance grinding of the flutes.

With the fixture in this position, place the reamer to be sharpened in the hole against the index pin. Now turn on the wheel and bring it up to the first flute and touch it. For the rest of the flutes merely pull reamer back to pass pin, turn it to the next flute, and return it to the stop.

Clint McLaughlin, Rockaway, NY



Altered Threads Speeds Clamping

Rapid-fastening devices are valuable assets in drill fixtures. This idea has found many applications because it is inexpensive, practical, and easy to use. The idea can be used as a quick-fastening screw, and as a quick-fastening wing nut.

Refering to the drawing, we wish to hold down plate A, which must be provided with an elongated hole to allow for side motion of the quick-fastening screw. In the case of the wing nut, no elongation in the plate is necessary.

The first step in preparing the body of the fixture is to drill and tap the holes for the clamping screws. Then mill a hole through the same location, but 10° to 12° off vertical, using a body-size end mill. Brace a washer, twice the screw dia, under the head of the screw to furnish adequate landing. After the burrs are cleaned off, and screw is found to drop into the hole at the milled angle, it is ready for use. The screw will hold when tightened perpendicular to the fixture.

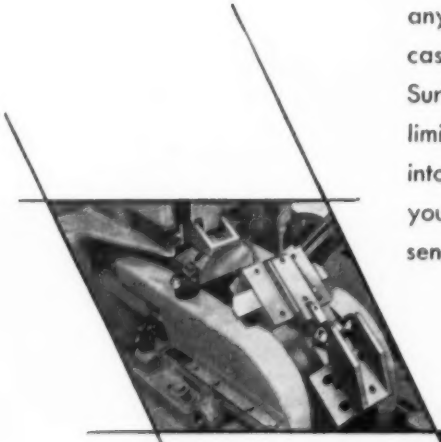
The hole is milled through the wing nut in the same manner, after a washer has been brazed on.

Edward Diskavich, Torrington, Conn

To cut machining costs, machine faster with continuous broaching

■ Higher machining production than ever achieved by any other method has been made possible in many cases through the use of the Footburt Continuous Surface Broaching Machines. In most cases, production is limited only by the speed at which parts can be loaded into the self-clamping fixture. Unloading is automatic. If you have a problem of high production on small parts, send blueprints and hourly requirements.

THE FOOTE-BURT COMPANY
Cleveland 8, Ohio
Detroit Office: General Motors Building



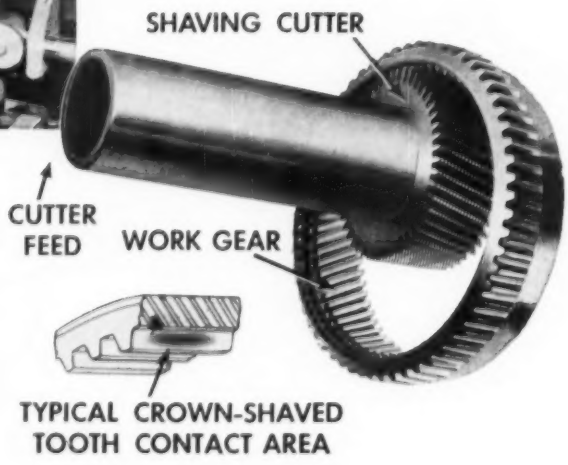
Engineered for production

FOOTBURT

PIONEERS IN SURFACE BROACHING

50% Reduction in Shaving Time

of CROWNED INTERNAL GEARS by NEW PLUNGE-CUT PROCESS



This typical internal automatic transmission gear is crown-shaved in 24 seconds machine time with the tooling shown.

Amount and position of crown for any specific work unit is optional.

The Plunge-Cut Process is equally applicable to straight-tooth gears and with the same economy in shaving time.

If you are mass-producing internal gears, write for Bulletin S55-6 on Internal Gear Shaving Machine, Model GCR

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

7331

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

American Machinist REFERENCE BOOK SHEET

TAP-DRILL SELECTION..I

WARREN G OGDEN, JR. methods engineer, Instrumentation Laboratory
Department of Aeronautical Engineering, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Few people in engineering and mechanical fields realize how much depends on selecting the maximum allowable tap-drill size for preparing a hole for tapping. This is true, in particular, when tapping some of the materials currently used in miniature components of military goods. Pure beryllium, hafnium, the high-temperature alloys give trouble in tapping, when the percentage of thread engagement is a bare minimum, say 50 to 55%. Tapping difficulties also arise with stringy metals like copper, drawn aluminum, Monel metal, nickel silver, and soft stainless steel, which, because of their malleable nature, have a tendency to flow toward the crest of the minor diameter. Thus, the effective thread engagement is increased.

Most tap-drill selection tables have been worked up for a 75% engagement of thread. In use for many years, and based on experience with a free-machining material like brass, these tables have little relationship to the wide range of metals machined now, and the characteristics of those metals.

The man doing experimental work or small-lot production on pure beryllium parts, for example, won't get very far with a 75% depth of thread. He will break taps. Actually, he can get satisfactory strength in the fastening with a 50% thread depth in most instances, and particularly when the hole depth is more than 1½ times the diameter. For the vast majority of tapped-hole requirements, a minor diameter that provides a 55 to 65% thread height is considered adequate. The 55% minimum is safe, and more than 60% is not really needed. Why?

Thread strength tests clearly show that any increase in thread height over 60% for the tapped member does not increase the static strength of a threaded fastening. In general, the bolt will break at 55% of engagement.

On the other hand, the minor diameter of the internal thread has an important relationship to the torque required to drive the tap. As a general rule, torque is doubled when the percentage of thread height is increased from 60 to 72%, and tripled when thread height is increased to 80%. Thus, the chances of tap breakage are vastly increased without securing any benefit in respect to strength.

Drills Cut Oversize. Under most conditions, drills cut slightly larger than their own size. Some light on this subject, as far as drilling of cast iron and steel is concerned, was developed through extensive tests reported by the Metal Cutting Tool Institute in "Drilled Holes for Tapping—1954," and further reported in Reference Book Sheets under the title "Tolerances for Tap-Drilled Holes" (*AM*—Apr 26 '54, p143). In general, it may be said that the oversize amounts to a reduction of thread height by 6 or 7%. For example: in tap-drilling for a No. 4-40 screw, a No. 42 drill (0.0935 in.) would presumably be selected to obtain a thread engagement of 57%. Actually the mean probable oversize, according to these tests, would be 0.0020 in., reducing the engagement to 51%. For a No. 43 drill (0.0890) the theoretical engagement is 71% and the probable engagement is 65%.

How to Use the Thread-Engagement Tables

For modern conditions the tables of thread engagement for machine-screw sizes, pages 125 and 127, are based on engagements from 50% to 83 1/3% in increments of 5%. The columns for 83 1/3% engagement are included solely for reference when boring holes in a screw-cutting engine lathe in preparation for chasing close-tolerance threads with a single-point tool.

EXAMPLE: Again take the No. 4-40 screw. Assume you want a theoretical engagement of 70%. There are four figures in the block under 70% engagement and opposite 4-40. The top figure, 0.0893, is the theoretical hole size. The next two figures show the size of the nearest metric drill in millimeters (2.25 mm) and in parentheses the inch equivalent (0.0886). The bottom figure gives the number of the American Standard drill, in this case No. 43 (0.0890). Allowing for the drill cutting oversize, the probable thread height will be around 65% in this case.

In some cases the blocks contain only one number, the theoretical hole size, because there is no equivalent standard drill, either inch or metric. Obviously, another height of thread must be selected. In other cases, only an inch or a metric drill is available.

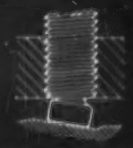
The great advantage of thread-engagement tables worked out in this fashion is the facility with which the shop man or engineer can select a tap drill that provides only the degree of engagement he needs. When he runs into trouble he can easily adjust to suit conditions without hunting through drill tables and making extensive calculations.

Tables on thread engagement for taps from ¼-20 to 1¼-12 (coarse and fine series) will be published in an early number. Likewise, a table of suggested percentages of thread for various materials will appear in the same number.

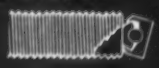
VLIER SWIVEL-PAD CLAMPS

Now Available in 2 Types!

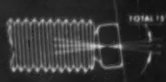
Both types have these outstanding features!



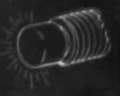
- Screw torque absorbed by pad—not the work piece.



- Unique ball-joint construction provides extremely smooth angle adjustment and rotation of pad.



- Pad swivels 7½° each side of center line in all directions.



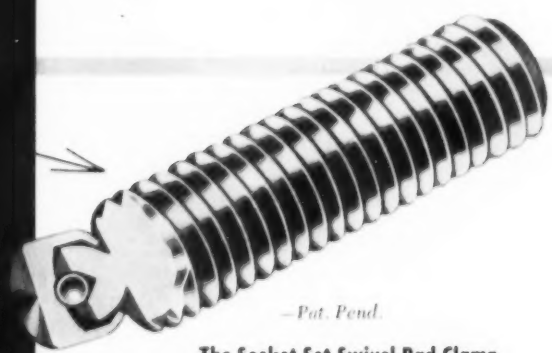
- Large flat pad area assures tighter clamping.

- Conical seat distributes clamping pressure uniformly.
- Eliminates costly, custom-made swivel pads.
- Du-Lite finish for rust proofing.
- Made from heat-treated, alloy steel to last for years.

—Pat. Pend.

The new Knurled Head Swivel-Pad Clamp

Use when finger-type clamping is sufficient. Wide knurled-head gives good gripping; assures fast screw run-in. Available in 4 different screw diameters; 1½" and 2" screw lengths.



—Pat. Pend.

The Socket Set Swivel-Pad Clamp

Use wherever maximum rigidity is necessary, or where space is limited. Available in 7 screw diameters; various lengths.

Other Vlier products

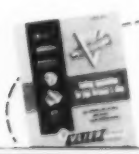
Spring Plungers

Spring Stops

Toggle Pads

Fixture Keys

Torque Thumb Screws



Write for free 1956 Vlier catalog.

VLIER ENGINEERING INCORPORATED

8900 Santa Monica Blvd., Los Angeles 46, California

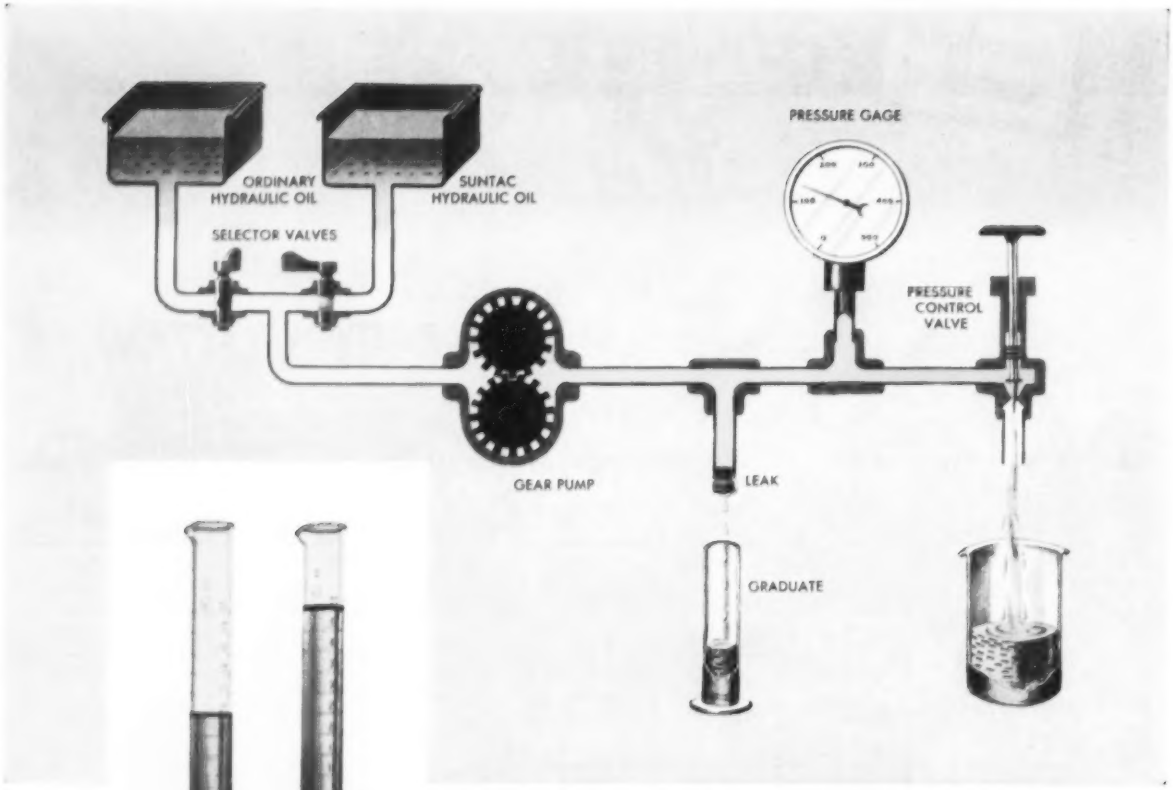
Distributors located in major U.S. and Canadian industrial areas.

TAP-DRILL SELECTION.. II

Percentage of Thread for Machine-Screw Sizes

	83⅓%	75%	70%	65%	60%	55%	50%
0–80	.0465 (.0465) 1.18mm 56(.0465)	.0479 (.0477) 1.21mm 3/64(.0469)	.0486 (.0485) 1.23mm	.0494 (.0492) 1.25mm	.0502 (.0500) 1.27mm	.0510 (.0508) 1.29mm	.0519 (.0516) 1.31mm 55(.0520)
1–64	.0561 (.0564) 1.43mm 54(.0550)	.0578 (.0579) 1.47mm	.0588 (.0587) 1.49mm	.0599 (.0591) 1.50mm 53(.0595)	.0609 (.0611) 1.55mm	.0619	.0629 (.0630) 1.60mm 1/16(.0625)
1–72	.0580 (.0579) 1.47mm	.0595 (.0591) 1.50mm 53(.0595)	.0604	.0613 (.0611) 1.55mm	.0622	.0631 (.0630) 1.60mm 1/16(.0625)	.0640 52(.0635)
2–56	.0667 (.0670) 1.70mm	.0686 (.0689) 1.75mm 51(.0670)	.0698 50(.0700)	.0710 (.0709) 1.80mm	.0721 (.0729) 1.85mm	.0732 49(.0730)	.0744 (.0748) 1.90mm
2–64	.0691 (.0689) 1.75mm	.0708 (.0709) 1.80mm 50(.0700)	.0718	.0729 (.0729) 1.85mm	.0739 49(.0730)	.0749 (.0748) 1.90mm	.0759 48(.0760)
3–48	.0764 (.0768) 1.95mm 48(.0760)	.0788 (.0787) 2.00mm 47(.0785)	.0801 (.0807) 2.05mm	.0815 46(.0810)	.0828 (.0827) 2.10mm 45(.0820)	.0841 (.0846) 2.15mm	.0855 44(.0860)
3–56	.0797 (.0787) 2.00mm	.0816 (.0807) 2.05mm 46(.0810)	.0828 (.0827) 2.10mm 45(.0820)	.0840 (.0846) 2.15mm	.0851	.0862 44(.0860)	.0874 (.0866) 2.20mm
4–40	.0849 (.0846) 2.15mm 45(.0820)	.0877 (.0866) 2.20mm 44(.0860)	.0893 (.0886) 2.25mm 43(.0890)	.0909 (.0906) 2.30mm	.0926 (.0925) 2.35 mm	.0942 (.0945) 2.40mm 3/32(.0938)	.0958 (.0965) 2.45mm 41(.0960)
4–48	.0894 43(.0890)	.0918 (.0906) 2.30mm	.0931 (.0925) 2.35mm 42(.0935)	.0945 (.0945) 2.40mm 3/32(.0938)	.0958 41(.0960)	.0971 (.0965) 2.45mm	.0985 (.0984) 2.50mm 40(.0980)
5–40	.0979 40(.0980)	.1007 (.1004) 2.55mm 39(.0995)	.1023 (.1024) 2.60mm 38(.1015)	.1039 37(.1040)	.1056 (.1044) 2.65mm	.1072 (.1063) 2.70mm 36(.1065)	.1088 (.1083) 2.75mm 35(.1100)

CONTINUED ON PAGE 127



The leak rate of ordinary oil vs. Suntac was measured in test machine simulating a typical leak in a hydraulic system. Oil viscosities were equal, time and pressure conditions identical. The simple act of switching from the ordinary oil to Suntac, *without any other changes*, reduced oil leakage by 50%.

PRESSURE SYSTEM DESIGNED TO LEAK PROVES SUNTAC CUTS OIL LOSSES UP TO 50%

If you're having troubles with excessive oil leakage, a Suntac® oil can help you. Because of their unusual anti-leak characteristics, Suntac oils reduce oil consumption up to 90%, users report.

Suntac oils will not gum up or otherwise harm circulating systems. These oils are high-quality petroleum products with a life expectancy longer than that of ordinary hydraulic and circulating oils.

A change to a Suntac oil can lower your oil costs... improve housekeeping... result in safer working conditions.

Your Sun representative can tell you more about Suntac oils. Or write for Technical Bulletin 23. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-8.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

TAP-DRILL SELECTION.. III

Percentage of Thread for Machine-Screw Sizes

	83⅓%	75%	70%	65%	60%	55%	50%
5 – 44	.1004 (.1004) 2.55mm 39(.0995)	.1029 (.1024) 2.60mm 38(.1015)	.1044 (.1044) 2.65mm 37(.1040)	.1059 (.1063) 2.70mm	.1073 36(.1065)	.1087 (.1083) 2.75mm	.1102 (.1102) 2.80mm 35(.1100)
6 – 32	.1042 (.1044) 2.65mm 37(.1040)	.1076 36(.1065)	.1096 (.1082) 2.75mm 7/64(.1094)	.1117 (.1122) 2.85mm 34(.1110)	.1137 33(.1130)	.1157 (.1142) 2.90mm	.1177 32(.1160)
6 – 40	.1109 (.1102) 2.80mm 34(.1110)	.1137 (.1122) 2.85mm 33(.1130)	.1153 (.1142) 2.90mm	.1169 (.1160) 2.95mm 32(.1160)	.1185 (.1181) 3.00mm	.1201 31(.1200)	.1218 (.1220) 3.10mm
8 – 32	.1302 (.1299) 3.30mm 30(.1285)	.1336 (.1339) 3.40mm	.1356	.1377 (.1378) 3.50mm 29(.1360)	.1397	.1417 (.1417) 3.60mm 28(.1405)	.1437 27(.1440)
8 – 36	.1339 (.1339) 3.40mm	.1370 29(.1360)	.1388 (.1378) 3.50mm	.1406 28(.1405)	.1424 (.1417) 3.60mm	.1442 27(.1440)	.1460 (.1457) 3.70mm 26(.1470)
10 – 24	.1449 27(.1440)	.1435 (.1496) 3.80mm 25(.1495)	.1522 24(.1520)	.1549 23(.1540)	.1576 (.1575) 4.00mm 22(.1570)	.1602 21(.1590)	.1629 (.1614) 4.10mm 20(.1610)
10 – 32	.1562 5/32(.1562)	.1596 21(.1590)	.1616 (.1614) 4.10mm 20(.1610)	.1637	.1657 (.1654) 4.20mm	.1677 (.1673) 4.25mm 19(.1660)	.1697 18(.1695)
12 – 24	.1709 18(.1695)	.1755 17(.1730)	.1782 16(.1770)	.1809 (.1811) 4.60mm 15(.1800)	.1836 14(.1820)	.1862 (.1850) 4.70mm 13(.1850)	.1889 (.1890) 4.80mm 3/16(.1875)
12 – 28	.1773 (.1772) 4.50mm 16(.1770)	.1813 (.1811) 4.60mm 15(.1800)	.1836 14(.1820)	.1859 (.1850) 4.70mm 13(.1850)	.1882 (.1870) 4.75mm 3/16(.1875)	.1905 (.1890) 4.80mm 12(.1890)	.1928 (.1929) 4.90mm 11(.1910)

Most Flexible Production-Type Miller!

the Brown & Sharpe No. 12 Plain Milling Machine

Smooth Power Available with as much as full 10 H.P. at the spindle. Powerful back gear series—speeds up to 625 R.P.M. on 7½ and 10 H.P. machines.

Wide Range of Feeds and Speeds Over 40 spindle speeds—from 25 to 1050 R.P.M. on 3 H.P. machine, 25 to 1790 R.P.M. on 7½ and 10 H.P.—28 rates of table feed from ½" to 35" per minute.

Easy to Handle Practically every machine adjustment and set-up operation handled easily from operating position.

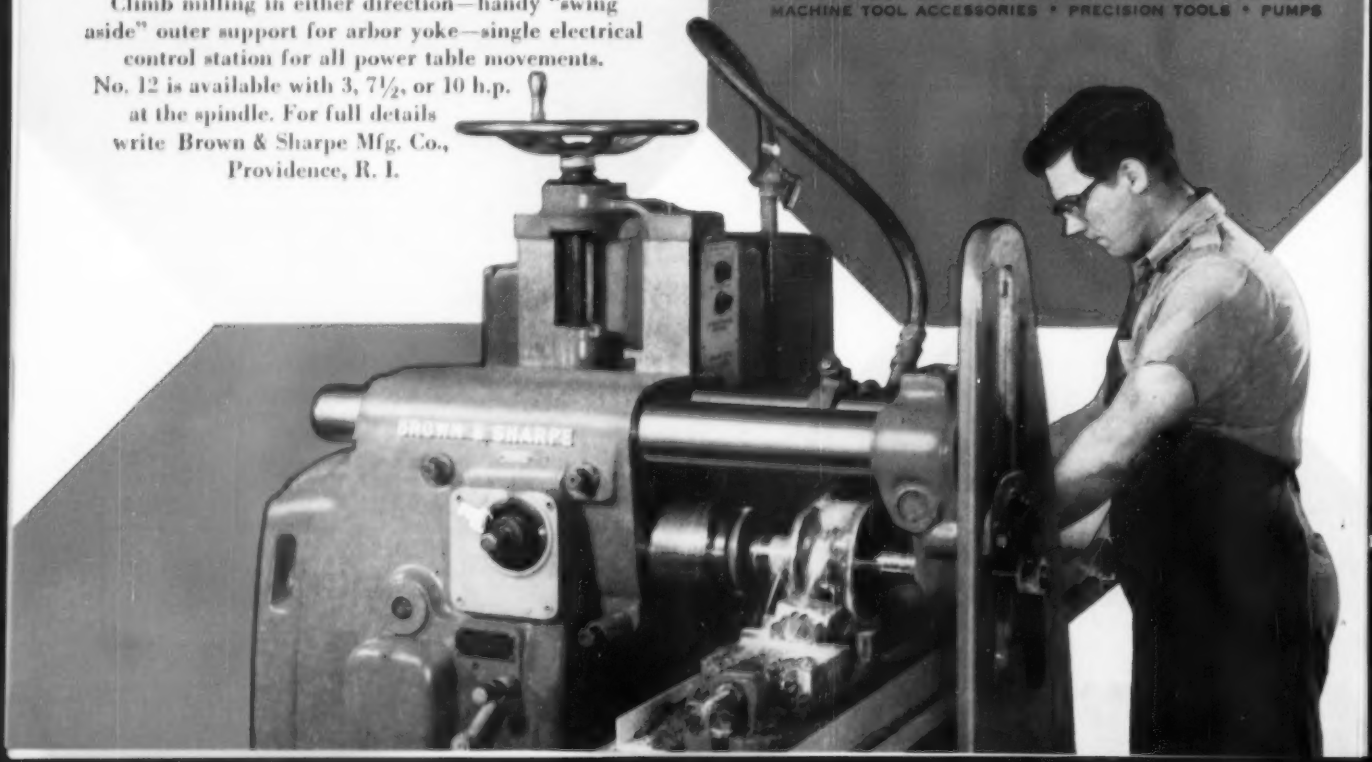
You can maintain high productivity on tough alloys and non-ferrous materials alike, using the Brown & Sharpe No. 12 Plain Milling Machine. There's plenty of smooth-flowing power to handle heavier cuts and get top efficiency out of carbide cutters. A broad range of feeds and speeds assures optimum cutting action on the widest variety of materials. And extra-convenient set-up and operation make both long *and* short runs economical. A few other outstanding features: Climb milling in either direction—handy "swing aside" outer support for arbor yoke—single electrical control station for all power table movements. No. 12 is available with 3, 7½, or 10 h.p. at the spindle. For full details write Brown & Sharpe Mfg. Co., Providence, R. I.

Ask About Our Pay-As-You-Depreciate Machine Tool Plan

B·S

Brown & Sharpe

MILLING, GRINDING, AND SCREW MACHINES • CUTTERS
MACHINE TOOL ACCESSORIES • PRECISION TOOLS • PUMPS



Talking Shop . . .

Robot Investment

FOR AUTOMOTIVE safety research, engineers wanted a robot man—in effect a dummy skeleton. Investment Casting Co, Springfield, NJ, took on the job of making Mark III. He has investment-cast cervical vertebrae, for proper neck articulation and responses. A boss on top of one casting fits a radial slot in the adjacent one.

30 Percenters

INDUSTRIAL RELATIONS and personnel men receive, on the average, 30% of the salaries paid to the presidents of their companies, according to Minn Industrial Relations Center. Some get as little as 5%, some up to 99%, but the middle half are in the 24 to 43% area. About half get an annual cash bonus averaging $220. Salary median is $9520, up 40% since 1948. There were 0.76 personnel people per 100 employees early this year, compared with 0.80 last year.

Federalese

THE ISSUE IS CLOSED: I'm tired of the whole business. REFERRED FOR APPROPRIATE ACTION: Maybe your office knows what to do with this. REFERRED TO HIGHER AUTHORITY: Pigeonholed in a fancier office. WE'RE EXPLORING THE PROBLEM: Don't get impatient; we'll think of something. FURTHER SUBSTANTIATING DATA ARE NECESSARY: We've lost your stuff; send it again.

That Tax Bill

TAX FOUNDATION experts report 151 taxes on a loaf of bread, 100 on an egg, 116 on a man's suit, 150 on a woman's hat, 600 on a house. On a $2000 car, there are $288 in taxes as it leaves the factory, and the final total is $555. A third of the average family's income goes out in taxes. . . . It is thus interesting to report an unusual statistic: For every dollar the Government spent in rehabilitating crippled men and women, $10 has come back as income taxes from them.

Scrap Consumer

NINE NEW USES for scrap iron and steel have been discovered at Battelle in a study for Institute of Scrap Iron & Steel. They include special recovery for scrap containing nickel, copper or other valuable alloy, shielding for radioactivity, powder metal, paint pigment, aid in disposition of radioactive waste, and as fill for road making.

Gold Spun

GOLD SHEET about 0.010 in. thick, in narrow strips welded together, was spun by Nooter Corp, St Louis, into a tank for an AEC experimental boiler-reactor. Handy & Harman supplied the 30 lb ($14,140 worth) of gold required. Procedure was to make a cylinder and two end caps, then hand-spin one cap and the cylinder to size on a VTL with an axe handle. Welding and sealing was the difficult job, because the tank must have no porosity—it holds a violently corrosive hot solution of fissionable uranium-phosphate salts. It becomes the lining for a heavy stainless-steel boiler that withstands 750 psi, will be filled with 44 gold-covered tubes that carry the water to be heated. Each is gasketed from the stainless with gold. The reactor will generate 200 kw of "heat power," is expected to be the answer for providing long-term power at isolated radar and other military outposts. Incidentally, the phosphate salts corrode anything but platinum and gold, and in this case gold is the "cheap" metal. The gold will gradually disintegrate into mercury—reversing the alchemist's dream.

Auto Pipe

COMPLETE AUTOMATICITY finds another convert—this time a soil-pipe casting machine made by Jeffrey Mfg Co, Columbus, O, on license from a Canadian inventor. The machine casts pipe centrifugally, and cuts it to length—in about a fourth of the previous time, according to Alabama Pipe Co, Anniston, which has the first one.

Shaggy Canine

IN A REMOTE Tibetan village, the people were troubled by a bear. They were afraid to stalk him, however, because his tracks were strange: two of bear paws, two of a child's feet. Finally, his depredations became so bad that they went to the High Lama for advice. He went into a trance, and came out with this suggestion: "Go to the House of Chan. Buy there teak wood from which to make a trap. That trap will catch your bear."

The trap was made, baited and set. Next dawn one of the villagers went to it, and was elated to see it had indeed caught the bear. He crept close, and saw that it was just an ordinary bear, the queer tracks being the result of malformation of the front paws—they did look like a boy's feet. He ran back to the village, seeking the headman, crying out: "We have caught a boy-foot bear with teak of Chan!"

Working Hours for You

EXECUTIVE WORK WEEKS range from 35 to 62½ hr, according to an AMA survey, against a work week of 40 hr. The 35 hr is put in by the president of a small company, but most presidents average 11 hr of overtime, most veeps 12, departments heads less than 8. Most of the overtime results from daytime conferences and meetings. Most reported the biggest timewaster is the telephone, the second is failure of subordinates to accept responsibility.

Another Defense Cutback

"More Bang with Less Men" Will Slash Defense Output

WASHINGTON—A major shift is shaping up in U S defense policy which will seriously affect metalworking companies producing military goods: the Eisenhower administration has decided it can hold down climbing defense costs by slashing conventional forces even more, that military striking power can be maintained and maybe boosted with less men in uniform.

The decision is part of the general trend toward more emphasis on strategic bombers, missiles, nuclear explosives, and other new weapons producing more bang with less men.

Inactive Plants Are Out

On the production side, this means that plants no longer in active production will figure less prominently in future mobilization plans. This is all based on the theory that (1) present industrial capacity and military forces are adequate to handle a "brushfire" or limited war; and that (2) if such a conflict develops into a general war—with increased demand for weapons and equipment—there would be little time for a prolonged industrial buildup because of the use of nuclear weapons.

It was such thinking which prompted the recent changes in Pentagon machine tool policy—the step-up in putting more reserve tools into current production, breaking up idle tool packages, killing the $400-million government machine tool stockpiling program.

Actually, this policy has been shaping up ever since the end of the Korean War. In 1953, the highly-touted "New Look" put greater stress on the air-atomic deterrent and allowed for most of a $5-billion reduction in defense spending and a 550,000-man cutback in conventional forces. Then last year's Joint Mid-Range Strategic Plan was formal recognition that the Russians had also mastered air-atomic power, and pointed up the prospect that the major impact of a future general war would be at the start.

The latest shift, which will be reflected by the fiscal 1958 military budget now being drafted, involves:

• Another reduction in the size of the 2,850,000-man Armed Forces, starting next July 1. The exact figure has not been set yet. But a cut of about 25% by 1960—mainly in the Army—is being studied.

Finis to Standby Lines?

• Some more scaling down in long-range mobilization plans. This means de-emphasis on layaway of machine tool packages and standby plants. As one Defense Dept official explained it to AMERICAN MACHINIST: "Money for industrial mobilization purposes is getting a hard look. We're spending too much on standby."

• A reshuffling of military organization and tactics to exploit the new weapons more economically. Many of the Army's 19 divisions and the Air Force's 50 tactical air wings are likely to be scrapped. Most of the remaining 17,000-man divisions will be ultimately regrouped into streamlined combat teams of 1000 to 7000 men.

Meantime, military spending will inch up—from $35.6 billion last year to some $36.5 billion in fiscal 1957. The increase will continue next year as more hardware procurement gets tied to advanced missiles and electronic gear. But the climb is unlikely to go over $1 billion annually. The manpower cuts will act as a lid.

The issue of new conventional force cutbacks comes to a head at this time because most of the fantastic new arms will be in heavy volume production for the first time in fiscal 1958. These are the factors behind the new decision:

• "With every passing month there is greater appreciation"—as one Pentagon official puts it—"of what (the new push-button weapons) can do." There is a growing realization that more firepower can be produced with less men. For instance, today's Army division—not counting nuclear warheads—has about 80% more firepower efficiency than the larger World War II division.

• The rising cost trend which the administration is determined to control. Despite earlier force cutbacks and the absence of any major program increases, defense costs are rising. The steel strike and the resulting price hikes, for example, are expected to add about $30 million to defense costs this year alone. Administration policy is to finance the defense program pay-as-you-go. A more costly program, it's felt, would cramp the civilian economy's growth, boost taxes, bring on new economic controls. In addition, there is the genuine belief among administration leaders—challenged by military critics—that U S military strength is already powerful enough to deter aggression.

• Tied to this is the serious belief in many high circles that Russia has abandoned direct military action as a means of imposing its will because of the fear of U S retaliation.

Allocation Program Overhaul

In the wake of the new policy shift, the Defense Dept's Production Allocation Program is getting overhauled. Under the program, plants are lined up to produce top-priority military hardware in a future emergency. Recently, 2000 plants were removed from the *Register of Planned Mobilization* producers bringing the total to 21,000; a bigger reduction is planned for January.

Within a few weeks, 470 weapons and pieces of equipment will be dropped from the Preferential Planning List, which sets down the items for which future producers are lined up. Almost 1000 items are currently listed. You can see how the strategists' view of future warfare is changing from the items to be removed: .30 and .50-calibre machine guns, C-123 assault air transports, the Skysweeper anti-aircraft gun, barges and floating cranes used in harbor support operations, railroad cars built for foreign gauge tracks.

The Air Force, in particular, is pushing the new mobilization policy changes. The Air Force no longer puts tools from a phased-out production project into mothballs. Instead, the lines are broken up; individual tools are put into current production or if not usable are disposed of. Stocks of idle Air Force machine tools are now the lowest ever. In addition, the Air Force is becoming less active in the Production Allocation Program, under the theory that its active production base will be able to accelerate output in case of an emergency. To this end, the Air Force's new tool modernization and replacement program has been set up.

Shot in The Arm for Ailing S-P

SOUTH BEND, IND—Studebaker-Packard, whose fate has dragged on longer than the soapiest soap opera, early this month moved into the comforting arms of Curtiss-Wright. As the honeymoon started, the famed Curtiss-Wright curtain of secrecy hid the couple effectively.

The merger - that's - not - quite - a-merger made headlines across the country. At that time, Curtiss-Wright's Roy Hurley let it be known that:

Under New Management

• Curtiss-Wright is moving its own "management advisory" team into the driver's seat at S-P, with Curtiss-Wright's Harold Churchill replacing James G Nance as president of the company.

• For $35 million, $25 million of which has been paid, Curtiss-Wright gets (1) ownership of S-P's guided-missile-producing subsidiary, Aerophysics Development Corp, Santa Barbara, Calif, plus some undisclosed "defense assets," (2) a lease on S-P's Utica, Mich, engine plant and its Chippewa St (South Bend) truck plant—both of them in defense work.

• Curtiss-Wright makes no bones about the fact that with S-P's added facilities it hopes to corner a lot more defense orders, in addition to those for the anti-tank "Dart" that come with the Aerophysics purchase, and that may soon run as high as $100 million. In all, C-W expects to put $200 million defense work into the three plants, including a $36-million contract for 5037 2½-ton trucks just awarded to Studebaker-Packard.

• S-P will definitely stay in the auto business. As Mr Hurley puts it, "There will be a Studebaker and Packard name on the road."

Daimler-Benz Is In It, Too

• Daimler-Benz A G of Germany is slated to get into the automotive act (as a foreign firm, it will have no connection with the defense end of the new combine). Daimler-Benz will turn out diesels for S-P's use, may go into a mutual sales agreement, with D-B selling Studebakers in Europe, S-P selling Daimlers and Mercedes in the U S.

Those are the facts revealed by Mr Hurley before the "no comment" lid was clamped down on the deal. But around Detroit knowing auto men say these rumors have more than a casual standing:

No Packard in '57?

• There will be no new 1957 Packard model—although Packard could put one out the same way it did a few years back when it slapped a new nameplate on and called it a new model. If by some chance this happens, it will be an auto birth without the helping midwifery of new tooling.

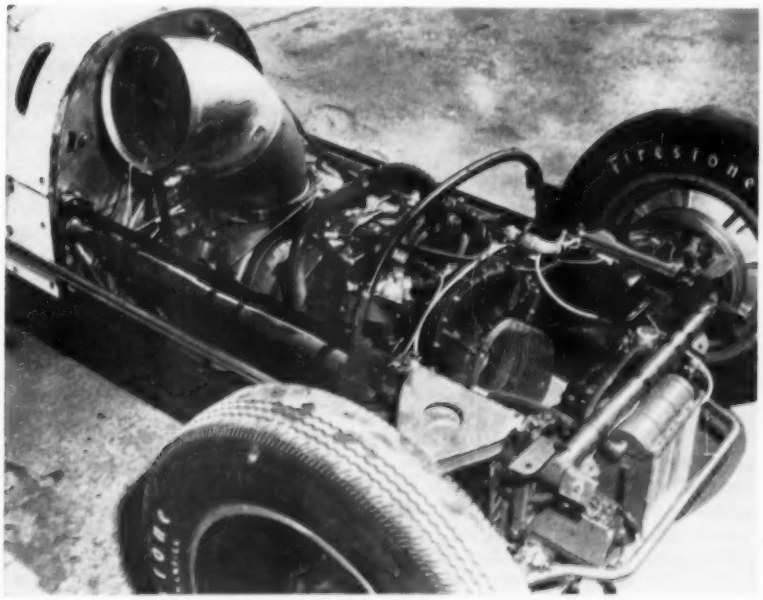
• *In 1958 Packard may blossom out with a redesigned, ultra-stylish car bearing the nameplate "Mercedes-Packard."* Such a car in all probability would feature such Daimler-Benz mechanical items as fuel injection and would be redolent of European styling. To some auto men this represents a potent challenge: they feel that the foreign-car angle would attract new customers, and that the old Packard name would rally old customers around the standard.

German Tooling for S-P?

• *Curtiss-Wright may turn in some measure to German tooling for both the Packard and the 1958 Studebaker* — even though Daimler-Benz snapped back sharply when Hurley said "An arrangement between Daimler-Benz and C-W on industrial and commercial gasoline and diesel patents has been reached." His modified statement that an "understanding" had been reached instead of an agreement brought no additional comment from overseas, and underlines talk that 1958 S-P autos will have some German refinements.

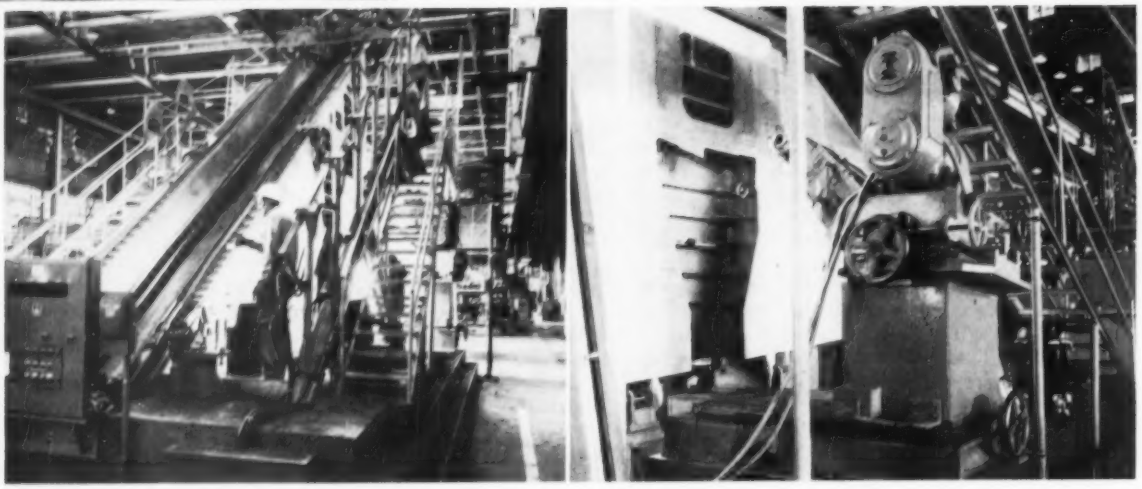
No More Engines for Utica

• Latest word is that no automobile engines at all will be made in S-P's Utica, Mich, plant. This plant was originally built and tooled for the J-47 jet aircraft project, was later retooled to produce V-8 engines. It's said that the V-8 tooling is already enroute to South Bend. But plans for the Utica plant are still under wraps. One source thinks it will be used to turn out the Dart missile, and possibly Ramjet engines. Whatever it is that Utica will turn out, the word around Detroit is that it will need lots of tooling, and that a lot of Curtiss-Wright money will go into it.



Gas-Turbine Racing Car

"SACFIREBOID" is the name of this racing car powered with a Boeing 502 gas turbine. Now owned by Firestone Tire & Rubber, the powerplant is a test engine that once powered a test truck. The Sacfireboid achieves 195 hp maximum and 175 hp continuously, weighs only 285 lb complete



Milling Roller Coaster at Convair

TOP AND BOTTOM EDGES of four wing skins for the Convair F-102 are milled simultaneously on this home-built "vertical miller" (see AM July 2, p135, and July 16, p133). The cutter head (right), shown at top of stroke, is fed by rack and pinion up a 30° slope. Leading edges of all four skins are milled at once to assure bilateral symmetry. At the same time, two boring heads bore out trunnion points for the main landing gear in the wings. One of the boring heads is positioned on each side of the fixture (one in rear of the general view at left, the other in the closeup at right). In the closeup view, the boring machine is withdrawn to show its construction, as well as the hole it bores. It is basically a column-type machine fabricated of weldments moved in on bed rails

Russian Deal for British Tools Stalled

Suez Crisis, Long Deliveries, Payments Cause Delay

LONDON (by cable from McGraw-Hill World News)—The Russians have not yet placed with British builders any orders for machine tools on the so-called Krushchev "shopping list." Moreover, no export license has been requested for any machines on that list to be shipped to Russia.

The visiting Russian delegation of technicians, headed by V A Malyshev, deputy chairman of the Soviet Council of Ministers, is said to have been taken aback by the refusal of British builders to give priorities to Soviet deliveries. The Russians were told that they would have to stand in line with other buyers.

The delay in the actual ordering, however, is related to other problems perhaps more serious than delivery schedules. Most vital of all is the removal from the strategic (embargo) list of certain types of machine tools that the Russians want. This problem falls within the scope of top government policy; and until the Suez crisis has eased, it is not likely that any important changes will be made in the embargoed list.

The question of payments also is a problem. Heavy Russian imports of British machine tools would result in a lop-sided balance of trade, with exports to Russia exceeding imports from Russia by 30%. Will Russia agree to pay off this balance in gold?

Prior to the Suez crisis, a number of British machine tool builders are reported to have felt that the strategic list (barring shipment of some machines to Russia and limiting others) had outlived its usefulness. Demands had been made in the House of Commons to "break down these silly restrictions." With Russia giving support to Nasser on Suez, the British feeling has changed and the pressure for an easing or elimination of the embargo has stopped. Should a reasonably satisfactory agreement be reached about the Suez Canal, it is believed that efforts to loosen the list would be resumed.

Even if all the problems are solved, no shipments of machines to Russia are expected before the middle of 1957. In certain British circles it is thought that the Eden government would not look unkindly on deliveries of machine tools to Russia even if it meant cutting down the number of machines available to home users. This action would help the government's anti-inflation drive which has temporarily discouraged capital investment in Britain itself.

Some feeling exists in Britain that the Russians announced their five-year program of purchases of British machines as bait to induce British industry to put on pressure to ease the strategic list. If so, the tactic succeeded—up to the Suez crisis.

The Russians have visited a lot of British plants, have collected catalogs and other literature about British machines, but orders have not been forthcoming. They told the Sentinel people, whose plant they visited three times in 30 days, that the decision regarding machinery to be bought would be made later.

Peter Thorneycroft, president of the Board of Trade, told the House of Commons that "it is too soon to expect orders . . . but I am confident that the visits to factories which we arranged have been most useful and I look forward to an increase in trade between our countries (Russia and Britain)."

British machine tool builders shipped to Russia in the first six months of 1956 a total of 910 tons of machines valued at 267,230 pounds.

Some New Ideas in Executive Selection

You might call it looking for industrial diamonds in your own backyard—this growing reasoning on the part of industrial firms that successful executives can't be bought ready made by the highest bidder—that the executive who is tailor-made to fit your company's needs is acquired on the installment plan of careful selection, careful guidance and careful training

CHICAGO—"Industry's best executives today are not injected from without but grow from within." That's the opinion of 66% of 500 industrial firms of all types and in all sections of the country surveyed by Chicago's John A Patton Management Engineers. Not only that, 86% of the surveyed companies have some type of executive selection and development program in the works.

How do most companies go about securing men with the greatest potential for management? What is the best source of executive material? What training methods are considered most effective? Here's the consensus of the more than 400 companies who answered, "Yes, we have an executive training program."

Some 72% of the interviewed companies choose prospective executives on the basis of objective selection tests and a series of structured interviews. The trend is definitely toward scientific appraisal of a man's personality, intelligence and possible weaknesses, as well as to general evaluation reports by trained industrial psychologists. Concrete results of screening, plus job performance, provide management with the best possible equipment for sound judgment.

Management is still looking to college graduating classes for executive material—but not on a "short-term grooming" basis. The man fresh from the classroom must learn the business from the bottom up. That's why management today is convinced that *the best executives are not injected from without but grown from within.* That's why 66% of the surveyed companies believe that the company itself is the best source of executive material. *Today's emphasis is not on a college degree or the lack of it, but on the individual!*

Companies divide on the most effective type of training program: 52% use the participation type; 48% use other types, such as lectures and individual training; and 30% indicate that they use visual training devices —charts, slides, graphs, movies and Vu-graphs.

The percentage of incentive plans for executives now in effect doesn't indicate full acceptance by management (44%), although further correspondence between the Patton organization and the surveyed firms reveals that many companies contemplate installation of such plans. The vast majority have a bonus or profit-sharing plan.

Health Is a Vital Factor

Once the executive is selected, companies tend to be solicitous about his health. Most companies (60%) have regular health programs. Others have mandatory, periodic examinations.

Experiential knowledge of executive selection and training problems has provided these recommendations for the establishment of a ready source of well-selected, well-trained, competent young men for key management positions.

(1) Get them before you need them . . . Hire good young men with the proper background for *your* business.

(2) Select them carefully . . . By means of interviews and tests, determine which of these young men can be promoted to supervisory or executive jobs.

(3) Record them . . . Keep a record of the young men, and the possible jobs to be filled by them.

(4) Rate them . . . Rate the men in this group at least once a year.

(5) Rotate them . . . Rotate these men in your business—horizontally. This means that they should be transferred from department to department, division to division, until they have achieved all-around experience. Then, when they reach the higher echelons, they will have the required broad experience essential to success—and the inevitable success of the business.

(6) Integrate them . . . As the young men are moving up, have them sit in on policy-making meetings to see what makes the company click. It is important that they gain this knowledge *before* they reach the top.

(7) Provide incentives . . . Money alone won't make good key men. Profit sharing, shares in the company's stocks, bonus for production or good record—these provide not only a feeling of security, but that other essential, a feeling of pride on one's job and in one's company.

B & S, Nelco Combine Sales Operations To Broaden and Expedite Tool Deliveries

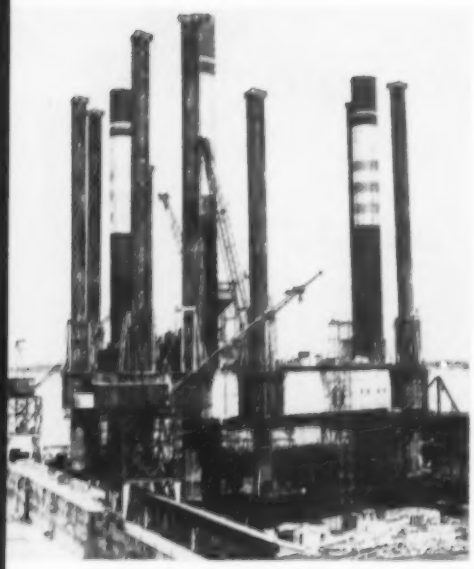
PROVIDENCE, R I—Beginning September 1, Brown & Sharpe Mfg Co and Nelco Tool Co, Manchester, Conn, will combine their sales operations to, as the companies put it, expedite "on the spot delivery of more than 3000 standard carbide, carbide-tipped and high-speed metal cutting tools and accessories" through their joint distributors.

Under the new setup, manufacturers may order any of B & S's 2300 HSS cutting tools, or Nelco's 700 carbide or carbide-tipped tools. Stocks will be maintained at every metalworking center to assure "milk route" delivery of the combined line of standard tools.

The sales engineering staffs of both firms will be combined to form a nationwide carbide tooling service, specializing in recommending specific, non-partisan tooling setups.

In addition to their standard lines, both Brown & Sharpe and Nelco will continue to produce special tools.

MIRACLE IN MAINE:



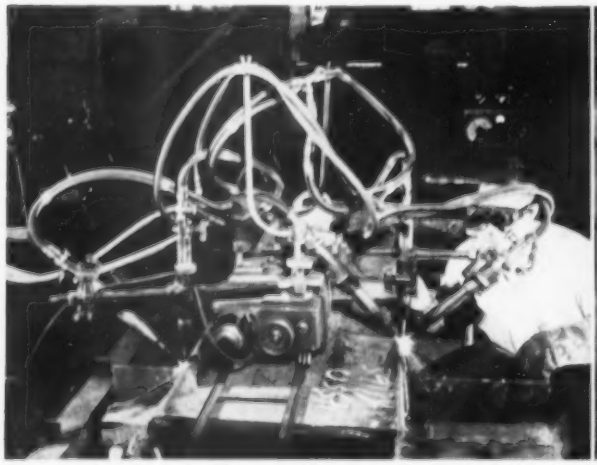
This is Texas Tower III . . .
The three striped columns are permanent caissons; the others raise and lower platform, will be cut away when tower is anchored at sea

Hydraulic jacks, grippers and gallows . . .
are mounted on a temporary leg (left). Permanent leg (right) has opposing "A" frames from which hydraulic jacks are suspended and anchored into rubbing strips to permit lifting or lowering of leg independent of platform. Sketches at right show sequence of jacking operation

PORTLAND, ME — They've just launched a metalworking miracle up here—Texas Tower III, second (the first never got off the drawing boards) of America's offshore radar warning towers. To launch TT III in record time (5 months), Continental Copper & Steel Industries Inc not only rebuilt the drydocks here into the world's largest (177-ft span) graving dock, it had to overcome a three months' delay in arrival of the structural steel needed to build the 2700-ton, two-deck platform. It took an around-the-clock, seven-days-a-week, five-month-long operation to launch TT III against a back-breaking deadline to avoid the hurricane season. And it took some pretty fantastic construction and fabrication methods to do it. The brains behind the operation belong to CC&S's assistant VP William D Miller, the man who built the atom bomb that was dropped on Hiroshima in WWII.

Probably the most outstanding construction feature that went into the building of TT III was the eight temporary caissons equipped with

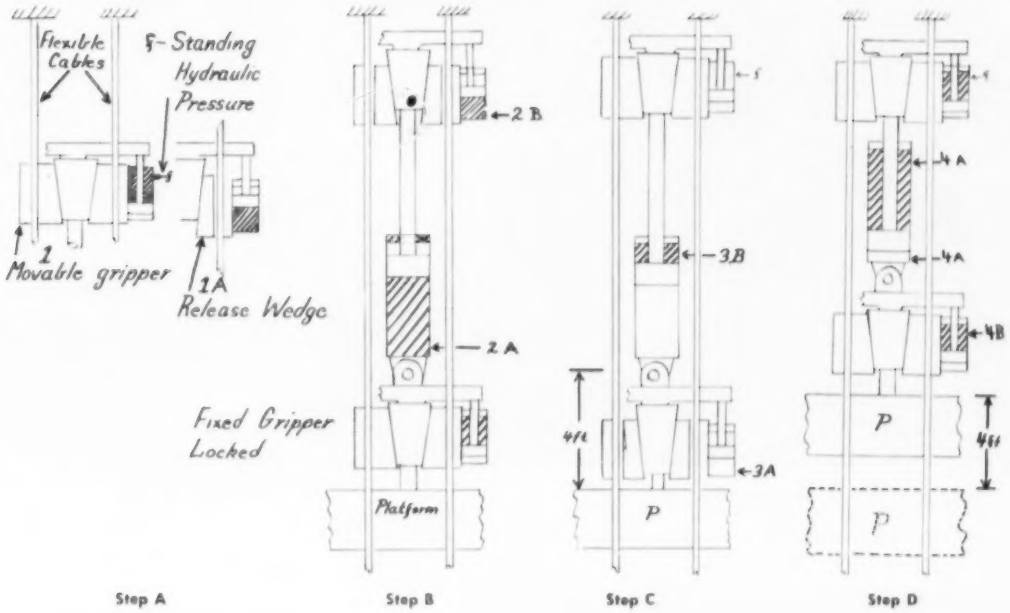
(Continued on p 136)



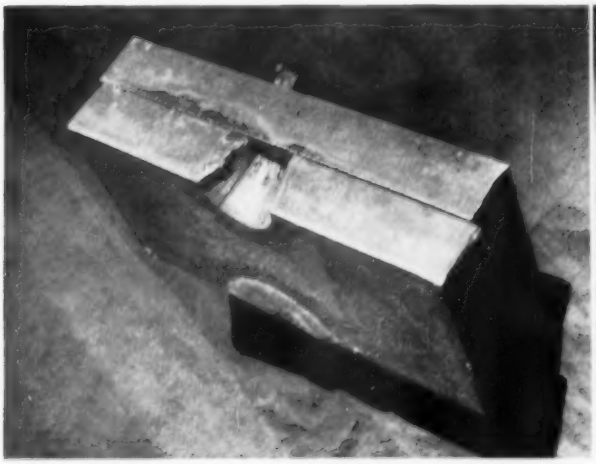
Structural steel plates are cut to width . . .
and edges beveled in preparation for welding, using an automatic five-gas-torch setup. Motorized carriage moves torches along at 12 ipm. Vertical torches cut plate to width; the others bevel to 45°

Cutting 15° tapered hole in 1.5-in. structural steel . . .
takes less than 3 minutes with this automatic setup. Operation is in preparation for plug welding plates for fabrication of main tie-in girders that support entire weight of platform on three permanent legs

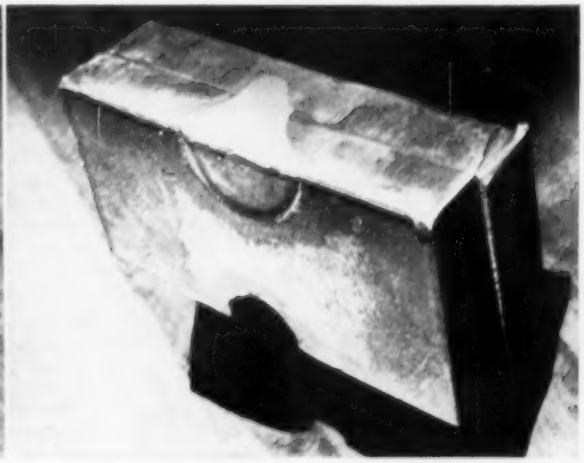
Tooling the Texas Tower



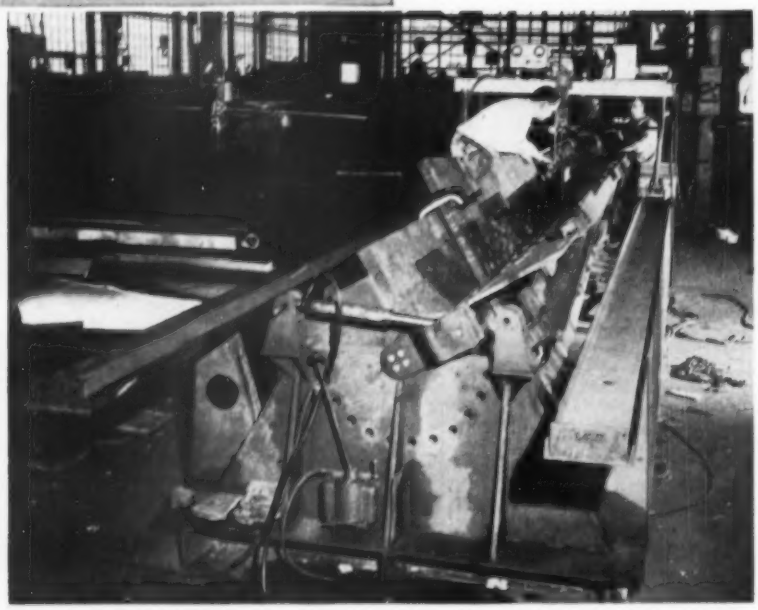
LIFTING TOWER PLATFORM: Step A—hydraulic cylinders on movable gripper (1) release wedges (1A) from suspension strands. Step B—pressure is pumped into jack cylinder (2A) to raise movable gripper assembly (2B). Step C—both sides of cylinder are blocked and grip pressure is applied to movable gripper, setting clamp. Wedges are released from strands on fixed gripper (3A)—in same sequence as for releasing movable gripper. Load is now transferred to movable grippers. Pressure is admitted to jack cylinder retract area (3B), and platform is raised 4 ft through lifting stroke. Step D—platform load is suspended from strands by upper gripper. Again both sides of jack cylinder are blocked (4A) and platform is now supported by column of oil in jack cylinder (4A), reacted by cylinder head and movable grippers locked to strands. Pressure is now applied to fixed gripper (4B), setting clamp. Then cycle is repeated to lift platform another 4 ft. To lower temporary caissons, cylinders and grippers are inverted, fixed grippers are attached to gallows frame



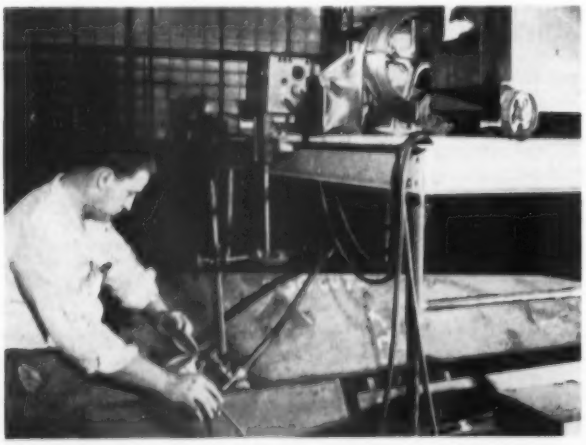
Plug welding was used instead of riveting . . . because design of main tie-in girders required that all surfaces be flush. This test specimen submitted for government approval shows tapered hole cut with the setup shown in photo at left



Completed plug-weld test specimen . . . shows the deep penetration of welding into secondary plate. Process of feeding 3/16-in. electrode wire into tapered hole is fully automatic, takes 1 min, 17 sec. Manually it took one man 1 hr, 20 min to do the job



Finish welding of main tie-in girder sections . . . is fully automatic. Shop-designed trunnion fixture hydraulically rotates sections through 180° to permit welding both conventional and horizontal fillets and square butts by the submerged-arc method



6020 5/64-in.-dia welding wire is reel fed . . . automatically through steel cable to torch for submerged-arc welding. Motorized carriage travels length of girder at a rate of 12 ipm. Rate of wire feed is automatically controlled for compensation. Operator is checking flow of flux through funnel

Welds are homogeneous . . . when produced on the above setup—and they're consistently uniform over the entire length of the bead. All welds are subject to 100% x-ray inspection. Submerged-arc welding's high-quality bead comes from lockout of hydrogen and nitrogen gases

TEXAS TOWER (continued)

28 Roebling hydraulic jacks for raising and lowering the tower platform during construction. Erection of TTIII differed from that of its predecessor, built by Bethlehem Steel, in that the platform was built first on cribbing. Then, four 25-ton cranes lowered the first sections of the caissons, both temporary and permanent, into the platform.

Slipped in Underneath

Using the temporary caissons and Roebling jacks, the platform itself was raised approximately 55 ft and assemblies of caisson sections 50-ft long were slipped in underneath the platform and welded to the upper section and then raised.

The Navy's prime construction contractor, Steers & Morrison-Knudsen of New York, had the job of raising the tower platform and of towing the tower out to sea and anchoring it. Here are some of the wrinkles employed by Steers & M-K in raising and lowering the platform:

Single Hydraulic Source

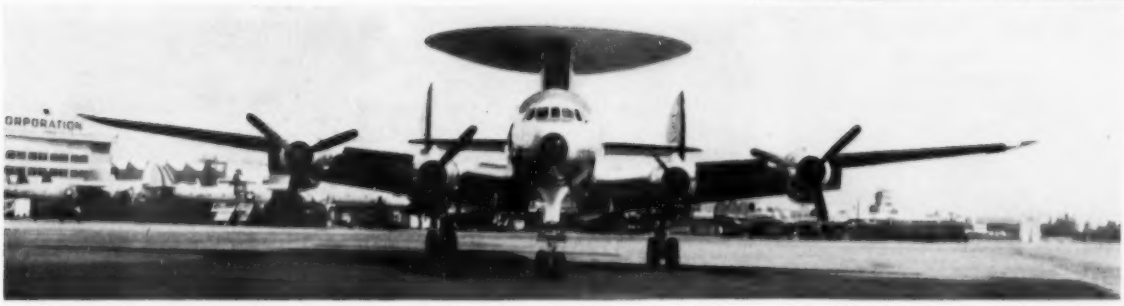
One hydraulic power source and a central control tower operated fixed grippers attached to the platform, and an independent set of movable grippers that extend upward along the lifting strands.

If during a lifting stroke one or more corners were low, the operator had several control options to remedy the condition. This was possible because all cylinder-head areas had a common connection through the manifold block, allowing oil flow between cylinders to permit the pistons to move for compensation. The trapped oil system had to remain at a uniform pressure.

At one point in the erection of the tower (see Step C on diagram on preceding page), the entire weight of the 2700-ton platform was supported by a column of oil trapped in the annulus of the jack cylinder. Weight thus supported hung from the movable grippers, which remained clamped.

More on the TT's Later

A detailed article on other unusual fabricating methods that went into the building of Texas Tower III, and that are currently being used as the takeoff point in building the really deep-water TTIV, will appear in *American Machinist* within a few weeks



Meet the "Piggyback Pancake"

It's not a victorious flying saucer perched atop a captured plane, and it's not a chic new hat that the latest plane is wearing—it's the Navy's new "Piggyback Pancake," a 30-ft radar dome mounted atop a WV-2 Super Constellation—part of the U S early warning radar network, it will give out-at-sea warnings

West...

Western roundup . . .

Hydro-Aire Inc, Crane Co's Burbank, Calif, subsidiary, reports its backlog for fuel booster and transfer pumps is almost four times that of a year ago . . . Latest Los Angeles Chamber of Commerce figures show that city's metropolitan area has 460 electronic equipment firms doing an annual factory billing of $1 billion . . . **Telecomputing Corp** has acquired **Brubaker Electronics Inc,** Culver City, Calif, maker of aircraft electronic control systems and missile components . . . **Norris-Thermador Corp,** principal West Coast supplier of automobile wheels, started making 14-in. wheels this month, predicts the bulk of wheels on 1957 auto models will be that size, rather than the 15 and 16-in. sizes it has made for nine years. Norris-Thermador, incidentally, will spend $1.5 to $2 million in the next year to improve its wheel facilities . . . **Garrett Corp** has merged its Los Angeles subsidiary, **Northill Co,** and its Belmar, N J, **Air Cruisers Division,** putting its marine and survival products under one management . . . **Industrial Tectronics Inc** will move into its new $300,000, 23,000-sq-ft Long Beach, Calif plant, in December. It'll make special-purpose precision bearings and balls there . . . **Douglas Aircraft** has just turned out its 700th DC-6 and DC-7 series transport, still has 294 to go on its backlog. Output will be stepped up from the present 10 a month to a new high of 15 a month by spring . . . **Pastushin Aviation Corp** has a $1.8 million Navy contract to make steel supersonic practice bombs . . . Seattle's **Northwest Lead Co** has been taken over by San Francisco's **Bunker Hill Co,** will become Bunker Hill's Sales and Fabrication Division . . . **Marchant Calculators** has location problems at its proposed new $4.5-million plant. Seems it straddles the boundaries of Berkeley, Oakland and Emeryville, Calif, runs afoul of three different building codes and tax structures . . . **Hall-Scott Inc,** Berkeley, Calif, engine maker finished up first half '56 18% ahead of first half '55, and did three times as much engine business as a year ago.

South...

Dixie newsbriefs . . .

Minneapolis-Honeywell Regulator Co will build a $4-billion plant near St Petersburg, Fla, to make aerial navigation systems. It'll occupy 207,500 sq ft of floor space, will employ 1500 . . . **Gray Iron Founders' Society** will hold its 28th Annual Meeting at the Homestead, Hot Springs, Va, October 31-November 2, will release its foundry marketing research survey data then . . . Union machinists at **Charleston, (S C) Shipbuilding Co** are striking for a 10% wage boost because "we are the lowest paid on the coast." Some 26 union men set up a picket line and 300 other employees refused to cross it . . . **Huntsville (Ala) Arsenal** is slated for almost $40 million worth of new construction starting July 1. Biggest item is facilities for a $25-million Army ballistics missile project . . . Also at Huntsville, **Mallory-Schwarzkopf Metals Inc** will have its new $1.5-million tungsten and molybdenum dimensioned-shapes plants in operation by January 1 . . . Floridians are still trying to guess where **Howard Hughes** will build his much-discussed aircraft plant. Latest area under consideration is Tampa Bay, where Hughes is expected to arrive to look over potential sites . . . Florida, incidentally, chalked up a new record for the number of new industrial plants established there in any one year—163 of them, including 11 electrical equipment plants, 16 industrial engineering and research establishments.

Midwest...

Midwestern notes . . .

GM's Cadillac Division has taken over the old **Hudson** plant in Detroit, adding 1-million-sq-ft to its sheet metal fabricating operations . . . Five-day **Midwest Work Course on Plant Layout and Facilities Planning** will be held September 4-8 in Kansas City, Kan . . . **Chrysler** is buying up more than 1700 acres in Troy Township, outside Detroit as "insurance for potential future expansion" . . . **S-P Mfg Corp,** Cleveland, has moved into its new Solon, Ohio, plant, where it makes power chucks and cylinders . . . **AMF's Thompson-Bremer Co** is adding 20,000 sq ft to its Chicago plant . . . **Chicago Threaded Fastener Co** has leased a 40,000-sq-ft building at 2030 W Carroll Ave, Chicago, will move all operations there . . . **National Rubber Machinery Co** plans to turn out tire molds in the old **Crescent Machine Co** plant at Leetonia, Ohio, by the first of the year . . . **Iowa Iron & Steel Works,** Cedar Rapids, is building a new plant and warehouse on a 24-acre site outside the city for fabricating structural steel and reinforcing rod . . . **International Harvester** farm implement plant layoffs: Richmond, Ind, September 23-November 5, 653 employ-

Field Report

ees; and **McCormick Works,** Chicago, (3500); Rock Falls, Ill (345), and Canton, Ill (1325) all will be shut from October 1 to November 5. IH's Louisville and Rock Island, Ill, plants will shut down, too, bringing the out-of-work total to 10,864 . . . **Godderz Engineering Co** has been set up at Minneapolis to provide general tool and engineering design service, particularly tooling and design of multiple-spindle machines . . . **Wesson Multicut Co** has a new plant in the works for Brighton, Mich. It'll produce only specialized tools for automated industries.

East...

Around the East . . .

Brooklyn Polytechnic Institute is beginning reconversion of the old American Safety Razor Corp plant, bought in 1954 for $2 million, into an engineering and scientific education center at a remodeling cost of $1.5 million . . . **Brooklyn Poly,** incidentally, will offer a jet propulsion course for ME's at its Long Island Graduate Teaching Center, Mineola, N Y . . . **Addressograph-Multigraph Corp** has bought out **Ralph C Coxhead Corp,** Newark maker of type-composing machines for offices . . . **Mosler Safe Co,** New York, has set up a new research affiliate, **Mosler Research Products Inc,** to develop new monitoring and security devices . . . **GE's Medium Induction Motor Dept** will spend $2 million to expand its atomic equipment facilities at Schenectady . . . Some 850 prominent citizens of New Castle, Pa, honored **Mesta Machine Co** with a "Welcome Mesta" dinner August 3. Mesta just bought United Engineering & Foundry's old 45-acre foundry plant there . . . **Gerotor May Corp,** hydraulic equipment maker, will move out of its Baltimore plant into a new, 64,000-sq-ft one at Leslie, Md . . . **Bendix Aviation Corp's Radio Division,** Baltimore, will go out of the home television set business. Reason: too many other commitments to make electronic equipment . . . **Stroukoff Aircraft Corp,** Trenton, N J, will turn out its first YC-134 assault transport and support aircraft this fall . . . **Mutual Electric Industries Corp,** New Rochelle, N Y, is being sued by Detroit's **Essex Wire Corp** for using the same (Essex and SX) trademarks used by the Michigan firm for 26 years . . . November 26 to November 30 will be "Automation Week" in New York, according to an official pronouncement by New York's Mayor Wagner. That week New York will host the Third International Automation Exposition, Fordham and Manhattan College-sponsored conferences on automation, and the annual meeting of the American Society of Mechanical Engineers . . . **Vanadium-Alloys Steel Co** plans to double the capacity of its Latrobe, Pa, mill within the next 15 months . . . **Firth Sterling Inc,** Pittsburgh, is upping its base prices for HSS 8¢ per lb in line with the recent steel settlement, and its extras 8% too . . . **Rock Bit Corp,** Philadelphia, has filed an injunction against **Delaware Tool Steel Corp,** Wilmington, Del, charging Delaware's trade name "Saber" is too close to Rock Bit's "Sabur," in use since 1948. Both are types of concrete-breaking tools . . . **Curtiss-Wright** will spend $50 million to expand its research and development center at Quehanna, Pa . . . **Chrysler** is again pushing conversion of its Newark, Del, Tank Plant to Plymouth output after a slowdown for lack of steel during the strike . . . **Third National Symposium on Reliability and Quality Control in Electronics** will be held January 14-16 at the Statler in Washington.

Red Ring No. 2000 . . .

This is the 2000th Red Ring rotary gear shaving machine turned out since 1934 by National Broach & Machine Co, Detroit. Proudly displaying No. 2000 is National Broach president Walter S Praeg, who holds in his hand a 1-in. dia automatic transmission gear with teeth precision-finished by the machine in 16 seconds

Foreign Report...

World newsbriefs . . .

Among the many Czech-made machine tools to be shown next month at **Czechoslovakia's Brno Engineering Exhibition** is the P-50, a machine that automatically cuts, drills and reams such components as gear wheels and pulleys up to 500-mm dia. All the operator does is replace a finished part with a new one and restart the operation, enabling him to attend 2 to 6 machines simultaneously . . . Caterpillar Tractor Co Ltd has bought out Birtley Co Ltd, Dunham, **England,** maker of earthmoving equipment . . . First postwar all-built-in-**Japan** aircraft engine, a 6-cyl, 240-hp reciprocal engine for light aircraft, will go into production at Kawasaki Aircraft Co soon . . . **West Germany** reports its labor force has increased by nearly 5-million employees to 18 million since 1948. Six million of the workers are women . . . **Austria** has set up a permanent Committee on Automation, made up of various ministries and labor groups . . . **Puerto Rico** reports its "Operation Bootstrap" has attracted 108 new industries down there in the last 12 months. Among them: United Drill & Tool, a $1-million American Can Co plant, a GE light meter plant, and a plant for GE's Trumbull Components Dept, and a Sunbeam Electric plant. Favorable tax climate is the big lure . . . **Australia's** General Motors Holden Ltd has just turned out its first completely new car model since 1948. It's power has been raised to 70 hp, wheelbase is longer (105 in.), center of gravity lower, and wheels are smaller at 13 in . . . Hyster Co plans to open a 40,000-sq-ft materials handling equipment plant soon at Sao Paulo, **Brazil** . . . **Spanish** government is negotiating for purchase of 5000 trucks and autos from British makers, will allocate them to doctors, engineers, professional people . . . **Italian** government will display the wares of some 500 Italian firms at **Mexico** City's National Auditorium February 22 to March 13, 1957. **Japan** and **Germany** have already done the same thing in an effort to capture a lion's share of the growing Mexican industrial market . . . **Argentina** will split an order for 120 diesel locomotives between the **United States, Japan** and **France.** Japan expects to export $702 million worth of machinery by 1960.

T H Doan (see below)

Marquand J Anderson, vice president and general manager of Aro Equipment Corp, Bryan, Ohio, has been elected president to succeed **John C Markey,** named chairman of the board

Fritz A Zander has been elected executive vice president of Micrometrical Mfg Co, Ann Arbor, Mich

Names in the News . . .

T H Doan, president of Foote-Burt Co, Cleveland, has just completed 50 years of service with his company. He started as an apprentice in 1906 (at 75¢ a day) and after three years worked as a journeyman for a short time. He then worked in various departments, including purchasing, and was named general manager of the company early in World War I. In 1919 he was appointed vice president and turned his attention to sales. He was elected president in 1933 and has served continuously in that capacity since then.

Fred M Glassford has been made manufacturing director of Chrysler Corp's Automotive Group; he has been serving as Dodge Division manufacturing manager.

Carl L Bausch, senior vice president of Bausch & Lomb Optical Co, Rochester, NY, has been elected board chairman to succeed the late **Joseph F Taylor. Dr Howard S Coleman,** director of the company's scientific bureau, has been appointed vice president in charge of research and engineering.

Donald Saunter has been named director of production and purchasing for Dodge Manufacturing Corp, Mishawaka, Ind. For the past five years he has been handling special assignments for the production manager.

James A Sloan has been elected president of Sloan Valve Co, Chicago. He succeeds **I H Russell,** who has retired after 41 years of service with the firm.

N A (Andy) Olsen is on leave for three months from his position as deputy director of the Metalworking Equipment Division, Business and Defense Services Administration, Washington, to manage the US Exhibit at the International Trade Fair at Stockholm, Sweden. US government is erecting a pavilion at the Fair to present an aspect of the American way of life, "Do It Yourself." In addition, a US Trade Mission is touring Sweden in advance of the Fair.

A scholarship has been established at Illinois Institute of Technology, Chicago, in honor of **Herman J Tonn,** cofounder and vice president of the Chicago Rivet & Machine Co, Bellwood, Ill. Mr Tonn helped organize the company shortly after the turn of the century when he emigrated to this country from Germany. The fund was set up by the Rivco Foundation, a philanthropic organization of the company.

Paul Jones has been appointed works manager of the Borg & Beck Division of Borg-Warner Corp. He was previously plant manager of Bendix Aviation Corp's Utica Division. **Howard E Blood, Jr,** manufacturing manager of the Detroit Gear plant of B-W's Long Manufacturing Division, has been named administrative assistant to the division president. **W E Rowe,** manufacturing manager of Long, will take over Mr Blood's former duties at Detroit Gear.

OBITUARIES

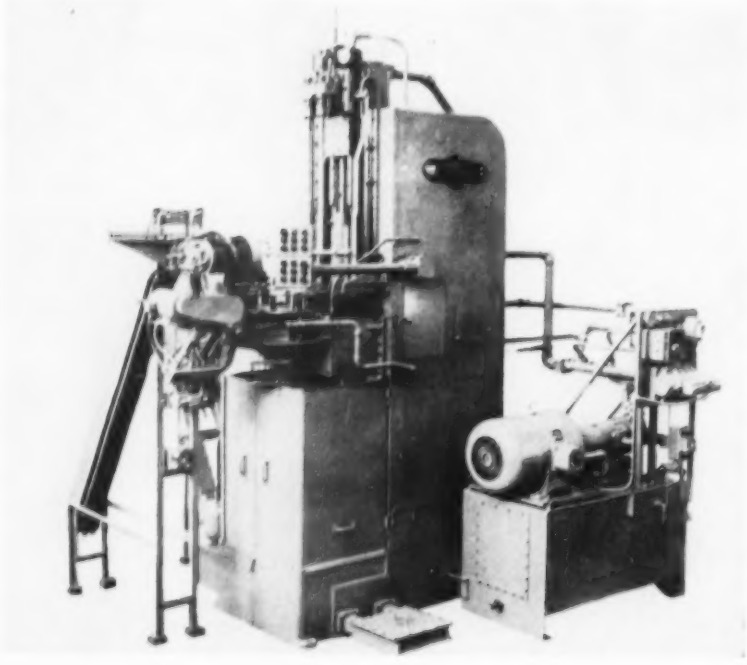
Freas M Long, 72, retired director of foreign sales for the Gisholt Machine Co, Madison, Wis, died July 26. Mr Long retired last year after completing 48 years of service with the company.

Carl Rydin, 37, president of Excelsior Die & Tool Co, Chicago, died recently in that city.

Ancil H Bishop, 65, vice president of US Industries, Inc, died recently in New York.

Hugh L Adams, 74, co-founder of the Budd Manufacturing Co, Philadelphia, died Aug 6 in New York.

New Shop Equipment,



American Broach Pull-Down Machine Gives Continuous Automatic Operation

Model PD-5-25-54 vertical hydraulic broaching machine, a 25-ton unit with 54-in. stroke, is electrically controlled, with all components interlocked to provide continuous automatic operation. For better maintenance accessibility, hydraulic systems are self-contained and are located outside machine column. Unobstructed face on the heavy-duty column allows a wide range of tooling adaptation.

Machine can be tooled with radially locked pullers, hydraulically actuated and electrically interlocked to machine cycle; this assures that broaches are positively locked in pullers before machine cycle can continue. Further electrical interlock can be mounted on retriever unit to assure proper positioning of broaches in retriever heads during broaching stroke.

Machine has provisions for the adaptation of a chip conveyor, loading conveyor, and work ejector for installations demanding fully automatic operation.

Broaching cycle is as follows: Loading conveyor transfers two parts at a time to the index table, where they are indexed to broaching position. Retriever carries broaches down through parts and into pullers. Pullers lock and machine slide starts its broaching stroke; at end of stroke, table indexes, providing free passage for broaches to return to starting position. Table then indexes for next cycle.

American Broach & Machine Co, Ann Arbor, Mich

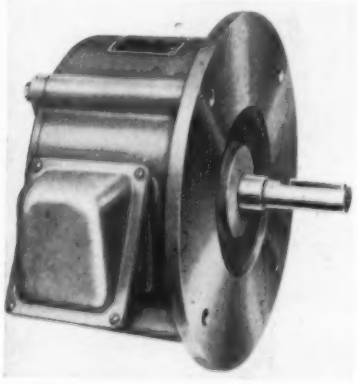
American Blower Expands Gyrol Fluid-Drive Line

Series of Class 2 adjustable-speed Gyrol fluid drives for 1- through 25-hp applications expands company's line. Units protect drive motors and driven machinery from shock loads, torsional vibration, and excessive torque, are said to take little maintenance and to repeat automatically various speed settings with uniform accuracy.

Drives are self-contained units, in which all moving parts are continually bathed in large volumes of oil. Output-shaft speed is altered by varying the amount of oil in unit's working circuit. Power transmission is accomplished hydraulically; there is no metal-to-metal contact, hence no wearing parts in the working circuit.

Drive reportedly permits drive motor to come up to speed under virtual no-load conditions. Load may be declutched from motor at any time during cycle of operation.

American Blower Corp, Detroit 32, Mich



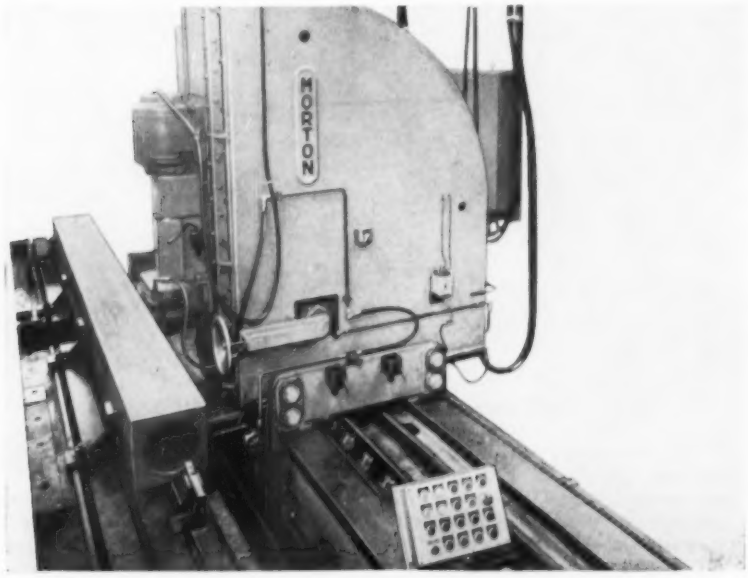
Diehl Flat-Type Motor Cuts Space Needs

Designed to meet specifications for NEMA Design B motors, flat-type motor available in totally enclosed designs (fan-cooled or non-ventilated) was developed for use in operations where there is a minimum of space. Units are said to weigh considerably less than standard motors, and are of radial design, constructed like conventional squirrel-cage motors. Rotor weight is evenly supported between two ball bearings.

Operating at 208, 220/240, or 550 v, 2 or 3 phase at 60 c, continuous or intermittent duty, motors are available in ratings from 1/3 to 7½ hp.

Diehl Mfg Co, Finderne Plant, Somerville, NJ

Materials and Parts . . .



Morton Heavy-Duty Machine Grinds Long Straight or Curved Members

Special heavy-duty grinding machine is designed for grinding either straight surfaces or long curved, irregular surfaces by templet. Machine is basically a traveling-wheel type, with work remaining stationary. Rugged compound saddle is mounted on the bed and is moved longitudinally by means of a heavy-duty roller chain which is driven through sprocket-and-worm reduction by a variable-voltage or reversing motor. This drive gives a smooth flow of power in varying speeds up to 100 fpm.

Compound saddle provides a means by which the grinding column, on which the vertically movable spindle is mounted, can be moved toward or away from work a distance of 24 in. It is provided with automatic "in" and "out" cross feed and also with automatic vertical adjustment of spindle. Spindle is mounted on a saddle which can be moved vertically on a column to give approximately 48 in. of vertical travel. Mounted to rotate in the vertical plane, spindle is arranged so that grinding can be performed either on wheel periphery or by cup grinding. 30-hp motor drives spindle at 1200 rpm.

With the machine's design, any length of bed can be used. Unit illustrated has 30-ft bed, with 22 ft of working travel. Worktable and base are tied together, so that suitable coolant collection and return can be incorporated in the foundation.

Morton Mfg Co, Broadway & Hoyt, Muskegon Hts, Mich

G E Develops Motor For Battery Trucks

Offered in ratings from 1 to 2 hp, battery truck motor for industrial electric trucks and small personnel carriers is designated Model BC-48. Motor is rated at 12, 24, or 36 v and from 1000 to 2400 rpm. 54-lb unit has 6⅝-in. diameter and is 9¼ in. long.

Optional features include series, shunt, or compound construction; flange or base mounting; open or totally enclosed design; and single- or double-shaft extension.

General Electric Co, Schenectady 5, NY

...including

MACHINE TOOLS AND ATTACHMENTS

Sliding-Bed Lathe 142
Spark-Erosion Machine 143
Planer Drive 148
Grinder Infeed Attachment 152
Vertical-Cutting Bandsaw 154

TOOLS AND ACCESSORIES

Reamers 142
End Mill 143
Air Fixture Lock 150
Adjustable Keyway Broach 152

FORMING AND CASTING

Hydraulic Forging Press 142
Straightening Machine 143
Die-Casting Machine 144
Bench Press 146

WELDING AND HEAT-TREATING

Ultrasonic Soldering Equipment 146
Bench Oven 148
Small Furnaces 156
Endothermic Generator 158

CLEANING AND FINISHING

Electrostatic Spray System 148
Small-Parts Washer 150

INSPECTION AND LAYOUT

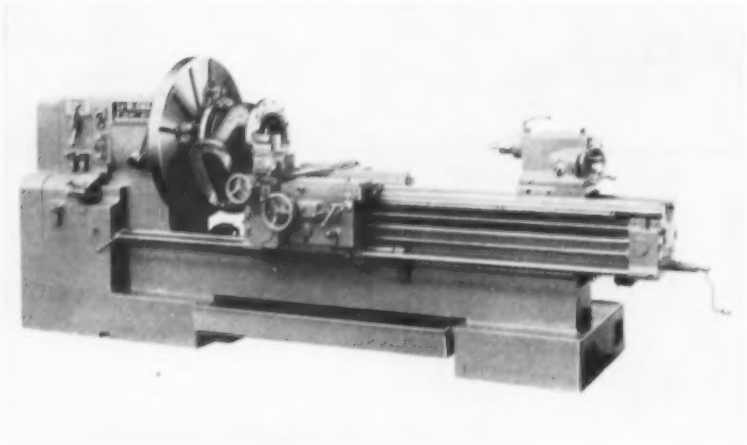
Ultrasonic Thickness Measurer 144
Plug Gage 148
Surface Vibration Calibrator 150

PLANT SERVICE EQUIPMENT

Fork-Lift Truck Attachment 150
Barrel Cart 156
Battery Charger 160

PARTS AND MATERIALS

High-Temperature Alloys 146
Large Control Panel 154
Hydraulic Control Valve 156



Sliding Bed on LeBlond Lathe Doubles Normal Swing Size

With bed closed, 16-in. gap lathe functions as a regular engine lathe. With sliding bed extended, normal swing size is doubled, with more than 50% greater distance between centers. Unit handles large-diameter work, extra-long pieces, and parts with large projections.

Special bed slides open to form a gap, enabling lathe to change shape to suit odd-shaped parts. Maker reports that the following unusual turning operations can be done: Face 38-in. diameters in one cut; face 45-in. diameters in two cuts; turn lengths more than 50% greater than normal center distance; with optional extension rest, turn 27½-in. diameter and 13¼-in. length; with optional full-swing turning attachment, turn 45-in. diameter almost full length of gap.

Other features of machine include redesigned spindle bearing, combination gear-belt drive headstock, 18 geared speeds and 9 timing belt-driven speeds from 8 to 2000 rpm, and four-way rapid traverse. In addition to 16-in. models, machines of 25-, 32-, and 17-in. size are offered in the sliding-bed model.

R K LeBlond Machine Tool Co, Cincinnati 8, Ohio

Aluminum Spacers in Valve Simplify Internal Construction

Quick-As-Wink Type B control valves, available in single and double-solenoid models as well as lever- and single-and-double piloted designs, have only one moving part—a hollow, radially ported, stainless-steel plunger. Flow is from inlet chamber through radial ports of the hollow plunger and out through other ports in the plunger to the connected line.

Valve chambers are formed by aluminum spacers held in accurate metal-to-metal end abutment, so that internal construction is greatly simplified. O-rings or U-packers are supported on both ID and OD without any mechanical pressure; this arrangement is also reported to permit quick, easy servicing in the field.

Valves are rated at 600 cpm for continuous operation on air at pressures from 40 to 150 psi, and can be operated at much higher speeds for intermittent duty on air at 80 to 100 psi. Exterior-feed valves can be used in hydraulic services at pressures to 250 psi, using air for the pilot medium. Interior-feed valves can be used on oil from 40 to 150 psi at somewhat lower cycling speeds.

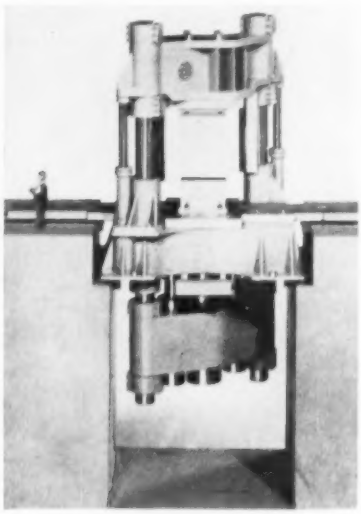
C B Hunt & Son, Inc, Salem, Ohio

Tomkins-Johnson Reamers Have Interchangeable Heads

Designed so that only the head needs replacing, after original shank has been bought, reamers are offered in head sizes from ½ through 2¾ in., in 1/16-in. increments. Left or right hand spiral flutes are available for through or blind-hole reaming.

Head and arbor are locked firmly together; tapered hole in head insures concentricity. Heads are made of special steel with Rockwell 66 hardness, shanks of less expensive steel.

Tomkins-Johnson Co, Jackson, Mich



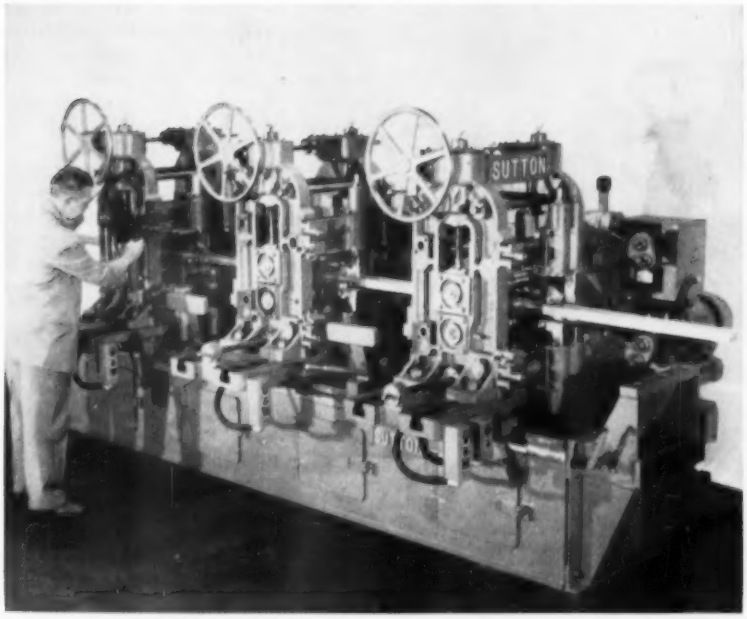
Giant Lake Erie Press Operates At 30 Forging Strokes per Min

2000-ton self-contained hydraulic forging press designed for Dunkirk, NY, plant of Allegheny Ludlum Steel Corp is a single-action unit of pull-down, 2-column design which operates at 60 planishing strokes or 30 forging strokes per min. Controls are mounted on a console adjacent to the press; 19½ ft of press are above the floor, 15 ft are below.

Clearance between the shields which protect the columns is 48 in. front to back and 90 in. left to right. Maximum working stroke is 72 in., with 120 in. maximum daylight between top and bottom bolsters. Center cylinder and two side cylinders governing the pull-down action are inserted in the lower crosshead. Two cylinders inserted in the bed platen interact with the pistons coupled to the upper crosshead for push-back action.

Twenty pumps, each having a capacity of 34.9 gpm of turbine oil at 4420 psi, are driven by 10 double-end, 150-hp, 1200-rpm motors, located away from the press. Bed of press is equipped with a movable die slide powered by a hydraulically operated gear and rack arrangement. Slide, which consists of six 7-ft-long coupled units, travels through 24 ft and constitutes the lower bolster.

Lake Erie Engineering Corp, 507 Woodward Ave, Buffalo 17, NY



Sutton Machine Corrects Contours, Straightens Aluminum Extrusions

Designed for contour correcting or straightening of extruded aluminum shapes, ruggedly built machine consists of one or more stands mounted on a common welded-steel base, and will handle extrusions up to 6½ in. high and 9 in. wide. Each stand may be moved along the base, so that the distance between stands can be increased or decreased as desired.

Each stand incorporates two inboard spindles for the mounting of driven rolls to provide the tractive force for feeding work through the machine or for use as conventional contour-correcting rolls. In addition, each unit has two sets of contour-correcting rolls arranged in the following manner: Two upper and two lower fixtures are mounted to provide four idler rolls which can be brought to bear against the work in the same vertical plane as the two driven rolls; four upper and four lower contour-correcting roll fixtures are mounted on cross-rails permanently attached to each of the main roll housings, and can be arranged to form a universal "Turk's head" adjustable as required while work is passing through the machine.

All fixtures are arranged for the easy insertion of standard and special roll holders, in which are mounted rollers of the desired shape and size. For straightening operations, two auxiliary spindles are mounted inboard of the main housings to accommodate straightening rolls. This arrangement makes possible a three-roll straightening setup in each stand, in which the top roll and one bottom roll are driven.

Sutton Engineering Co, First National Bank Bldg, Pittsburgh 22, Penna

Abaco Spark Machine Erodes 32-Sq-In. Surface

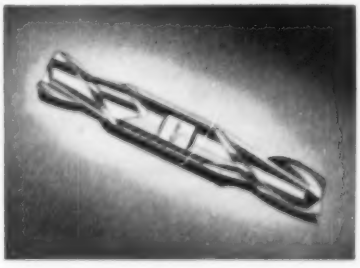
Using a high-frequency generator instead of electronic tubes or spark gap, this spark erosion machine, used to cut carbides, hardened high-speed steels, and other difficult-to-machine conductive materials, operates at 4.5 kw input. Complete unit consists of the machine tool and the power supply, shown here at right. Handwheel at center of power-supply cabinet controls speed of high-frequency generator to provide a choice of four different frequencies. Selector knob on power-supply panel provides selection of six different voltages. Thus 24 machining combinations are available to give the correct spark condition for a wide variety of materials in terms of cutting speed, hardness, and surface finish.

An electronic servo, at the panel center, controls the automatic electrode feed. This device provides maximum cutting speed for metal removal, yet minimizes arcing, burning, and idle time. If desired, the electrode-quill in the vertical head can be manually controlled. The quill servo-motor is enclosed in the head. A pump in the machine base circulates the dielectric oil.

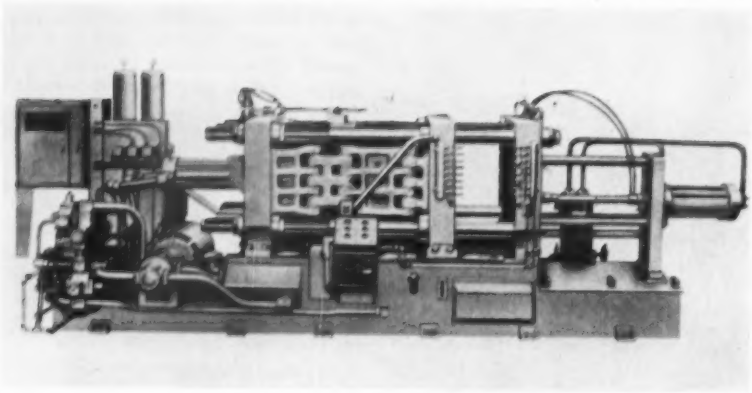
Machine is readily connected to any 220 volt, 3-phase power line.

Said to be the most powerful spark-erosion machine available this side of the Iron Curtain, this device will remove up to 32 sq in. of tool (electrode) area, or as little as 0.008 in. square. Removal rates are: Roughing—Nimonic—0.05 cu in. per min.; hardened HSS—0.035 cu ipm; average carbide—0.07 cu ipm. Finish is ±0.004 in. Semi-roughing hardened HSS—0.005 cu ipm with ±0.002 in. tolerance. Finishing hardened HSS—0.0005 cu ipm with ±0.001 in. tolerance. Ultra-finishing hardened HSS—0.00025 cu ipm with ±0.0005 tolerance, and a 10 mu-in. rms surface finish, or better.

Abaco Industries, Inc, 78-21 Queens Blvd, Elmhurst, NY



END MILL ground from the solid features a specially designed flute contour with width, depth, curve, and form relief of flutes arranged for maximum effectiveness in performance —*Eclipse Counterbore Co, 1600 Bonner Ave, Detroit, Mich*



Cleveland Die-Casting Machine Develops 600-ton Locking Pressure

Locking pressure on Model 600 die-casting machine is strain-gage tested, so that machine will lock dies securely and produce castings with a minimum of flash. Hydraulic circuit includes manifold construction with all tubing over 1 in. having flanged fittings welded to the tubes to reduce maintenance.

Fast-cycling machine has a 30-hp motor driving two Vickers pumps which deliver 99.7 gpm. 200-gal hydraulic reservoir and filter capacity is provided to insure maximum pump life.

Massive die plates are cut from solid steel blocks to decrease deflection to a minimum, and four large-diameter, high-carbon steel tie bars add rigidity and resist stretching under locking pressure. Each tie bar is deep-hole drilled and can be supplied with indicator rods and indicators for even distribution of locking-pressure load.

Control panel is separated from machine, thus removing electrical controls from effects of vibration. Panel provides all desired casting cycles, is furnished with pushbuttons within easy reach of operator.

Other specifications: size of die plates, 46½ x 46 in.; die opening, 8 to 15 in.; motor speed, 1200 rpm; floor space, 98 x 246 in.

Cleveland Automatic Machine Co, Cincinnati 12, Ohio

Down-time recorder plugs in anywhere and automatically resets itself. Device records when any production machine is down; 6-in. letters are visible up to 200 ft. Unit is totally enclosed and sealed.

Down-Time Recorders, Inc, 1323 S Wabash Ave, Chicago, Ill

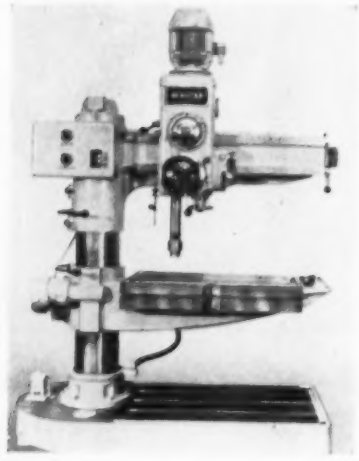
Magnaflux Ultrasonic Instrument Provides Direct Thickness Readings

Model SO-100 Sonizon, an ultrasonic thickness-measuring instrument, is a portable device, weighing only 30 lb, designed for heavy use in production testing. Measuring thickness from one side, instrument shows readings by a pip on a TV-type tube face as rapidly as a crystal probe is touched to the test surface.

Up to six thickness ranges are provided for direct readings from 0.014 to 0.500 in. Each range is used with its own scale, selected by turning a knob on front of instrument. Device will detect such things as thin spots in cast or welded objects, laminar defects and laminations, eccentricity in cored casting and cast-iron pipe, and lack of bond between materials. Accuracy is to ±2% of thickness, or ±1% when calibration is checked during tests against a sample of known thickness and of same material.

Also available is a harmonic comparator, which plugs into the Sonizon, for making thickness measurements over a 20:1 range without changing probes. Here one probe is placed on a machined, tapered comparison block, another probe on workpiece. When pips from each probe coincide on picture tube, thickness of work can be determined.

Magnaflux Corp, 7300 W Lawrence Ave, Chicago 31, Ill



Radial Drill Can Be Used for Sensitive Boring, Reaming

The smallest of a series of previously announced Master radial drills of the same design, 3-ft, 12-in. radial drill has design features which make it capable of sensitive boring and reaming as well as drilling. In place of the conventional arm that moves up and down the column, drill has a fixed arm which always remains at the same height and can be swung 360°. To position work, machine has a motorized table that moves vertically on the column. Table, also capable of swinging 360°, can be moved out of way when base is to be used for fixturing large workpieces.

Twelve spindle speeds, ranging from 60 to 2100 rpm, can be obtained through the pre-selector. Four spindle feeds can be selected by means of a feed-and-speed calculator located on center of head. Graduated depth control for use during hand or power operation prevents overdrilling.

Tapping can be done by shifting the forward-and-reverse clutch lever on the lower right side of head. Head travels on ground, prismatic slideways.

S & S Machinery Co, 140 53rd St, Brooklyn, NY

There's gonna be a great die

In those hard-to-get-at places ...for fine finishes and precision accuracies...use mounted wheels by CARBORUNDUM. For the most experienced advice on how to use mounted wheels in your shop, call your distributor or ask the man from CARBORUNDUM

REGISTERED TRADE MARK

Write for CARBORUNDUM'S *wall chart on die barbering abrasives, to: The Carborundum Company, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ont.*

Quiet, smooth, perfect performance...

in home laundry equipment using SKF* ball bearings

Leading manufacturers of home laundry equipment (names on request) rely on SKF Single Row, Deep Groove Ball Bearings for quiet, smooth-running performance.

Whatever your product, it will pay you, too, to switch to SKF anti-friction bearings and get the *plus values* which are built into every one.

SKF—EVERY TYPE—EVERY USE

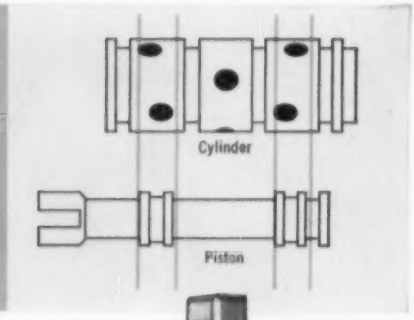
SKF

- *Ball Bearings*
- *Cylindrical Roller Bearings*
- *Spherical Roller Bearings*
- *Tapered Roller Bearings ("Tyson")*

*Reg. U. S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

MATCH PISTON LANDS TO CYLINDER PORTS PRECISELY WITH SHEFFIELD'S MICRO-FORM GRINDER



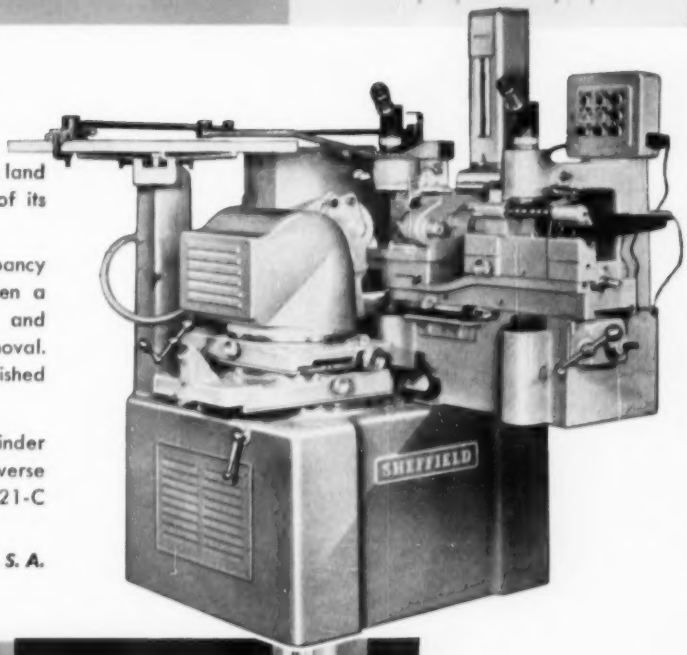
This servo cylinder and piston are typical of the very precisely machined hydraulic components in aircraft propeller and flight control systems.

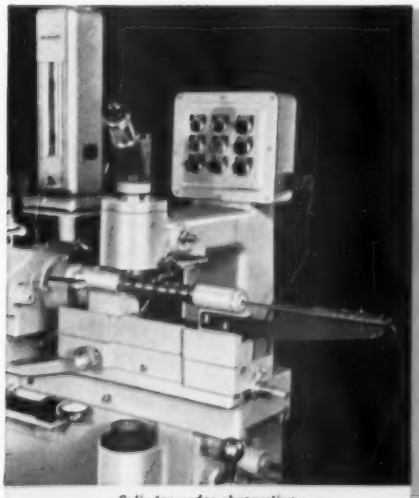
With the actual cylinder as a reference, each piston land is individually ground to match the inside edge of its respective cylinder port.

If a flow test then reveals the slightest discrepancy between land and port edge, the piston is given a finishing touch, using a Sheffield Precisionaire and Airetest Indicator to show progress in stock removal. Thus, the correction of the land face can be accomplished to within ± .000010".

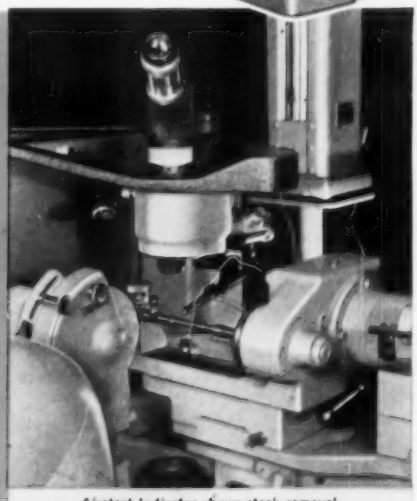
This is typical of the wide range of Micro-Form Grinder applications in duplicating precision profiles or reverse profiles from a master. Write for Bulletin MFG-121-C to Dept. 1.

THE SHEFFIELD CORPORATION, DAYTON 1, OHIO, U. S. A.





Cylinder under observation on auxiliary table.



Airetest Indicator shows stock removal in final correction.

7560

GOLDEN ANNIVERSARY

SHEFFIELD

manufacture and measurement for mankind

Woehr Roller-Leveler Takes 42-in.-wide Stock

Model 11-F roller-leveler flattens mild steel, hard-tempered steel, stainless steel, aluminum, brass, or copper in widths up to 42 in., and in gages from 0.020 to 0.093. Machine is used for straightening sheet or coil stock, producing cut-length flat sheet from coil, and work-annealing deep-drawing steel.

Machine operates at a standard speed of 56 fpm. Single sprocket change can increase or decrease standard speed as required. Power source is a gearhead, single-speed motor or an optional variable-speed drive. All eleven straightening rolls and the two feed rolls are made of hardened and chrome-plated alloy steel.

F A Woehr Machine Co, 17 Favor St, Rochester 8, NY

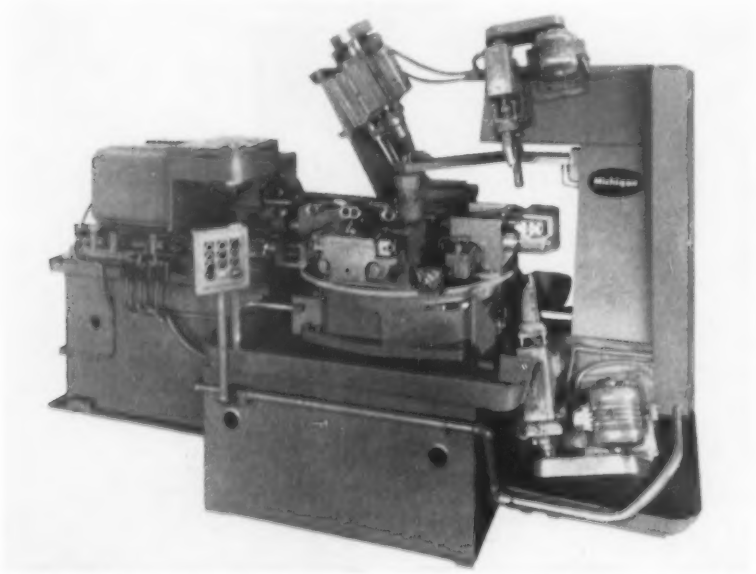
Inco Alloys Are Designed for High-Temperature Applications

Two high-temperature alloys for aircraft and industrial gas-turbine applications have been announced by International Nickel Co. The first, Inconel 700, is an age-hardenable nickel-cobalt-chromium alloy containing approximately 50% nickel and 30% cobalt. A modification of company's Inconel-X alloy, it can be used to make forged aircraft gas-turbine blades with adequate strength at 1650 F, 150 F high than is possible with Inconel X. This alloy is available as hot-rolled rounds from ⅝- to 2-in. diameters.

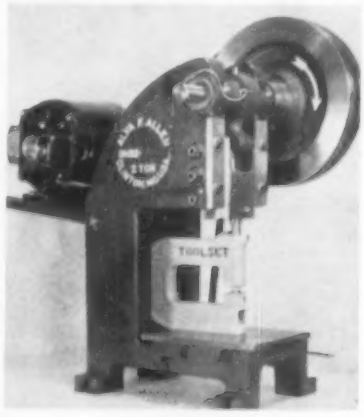
Second product, Incoloy 901 nickel-iron-chromium alloy, has been developed for use in aircraft and industrial gas turbines for those components requiring high creep and rupture strength in the temperature range of 1000 to 1400 F. Alloy has low co-efficient of expansion: containing 40% nickel, it is close enough to ferritic-alloy steels to permit the two materials to be joined without special provision for thermal expansion. Alloy is available in bar and forging-stock form, as well as in sheets.

International Nickel Co, Inc, 67 Wall St, New York 5, NY

ULTRASONIC SOLDERING EQUIP-EQUIPMENT, Sonobond Model S-O-H-55-12, is designed for soldering small electronic parts such as transistors. Model will tin silicon and germanium as well as a wide variety of non-ferrous metals. Equipment includes air cooling of transducer or soldering head to permit uninterrupted operation for long periods. Transducers are supported on a special elastic mounting which permits high acoustical efficiency. Tips between ⅛ in. and 0.020 in. or less can be accommodated—*Aeroprojects, Inc, 310 E Rosedale Ave, West Chester, Penna*



AUTOMOTIVE EXHAUST MANIFOLDS are processed on special machine called Angle-Matic. Unit mills locating pads and drills and reams the angular heat-tube holes at rate of 120 manifolds per hr at 100% efficiency. Five-way angular and horizontal dial-type machine features 4-station automatic index table and power clamping fixtures. Feed units consist of standard Hydro-5 column assembly and 9-in.-stroke quill units—*Michigan Drill Head Co, PO Box 4643, Detroit 34, Mich.*



TWO-TON BENCH PRESS built by Alva Allen Industries is specially designed to accept Toolset precision piercing units with interchangeable punches and dies. Press, designated Model BHS-2, has 8-in. shut height to accommodate Toolset units punching round or shaped holes. It has capacity of 3/16-in.-dia through ⅛-in. cold-rolled steel, or ⅜ in. through 16-gage and ⅝ in. through 20-gage—*Jerico, 4744 W Lake St, Chicago 44, Ill*

REVERE COPPER EXTRUSION shown attached to skirtboard before full assembly, which you can see below in exploded view. A matching bar, similar to the one shown is part of the "packaged" HANCO unit and is fastened to the opposite side of the screen. Units, in turn, are installed on the various types of Vibrating Screens made by HEWITT-ROBINS INC., Passaic, N. J., and are known as the HEWITT-ROBINS HANNON Electric Screen Heaters.

CLOSE-UP showing end of the Revere Copper Extrusion.

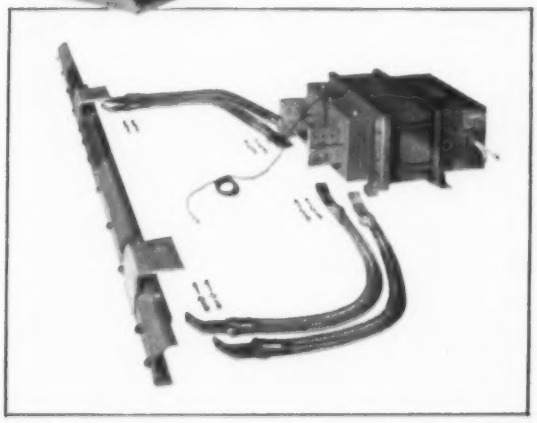
Revere Copper Extruded Shape

in Hanco Electric Screen Heater

out-performs

former copper casting

on 4 counts



"Customers of F. R. Hannon & Sons are now assured of many years of maintenance-free performance plus improved products."

Says T. W. HANNON, *Vice-President, General Manager*
F. R. HANNON & SONS, Canton, Ohio

Mr. Hannon continued, "For a number of years we had experimented with many different types of materials which would be non-porous, free from any burrs or voids, capable of maintaining a straight leading edge and able to carry 1500 amperes at 5 volts. The Revere Copper Extrusion meets these requirements. And for the rugged use to which our machines are put it would be virtually impossible to maintain satisfactory operating results without the use of this extruded electrical conductor."

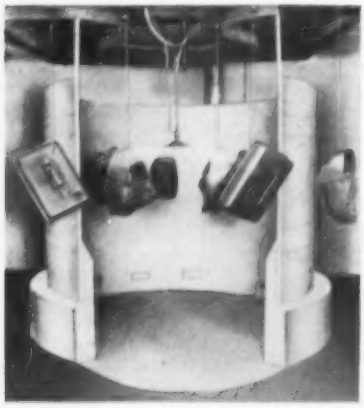
Perhaps there is a Revere Product that can help you give *your* customers a superior product, or help cut your production costs. You'll never know until you call the Revere Office nearest you and ask to have a T. A. (Technical Advisor) call. Why not make that call today?

Here's the Score!

COPPER EXTRUDED SHAPE	COPPER CASTING
1—12 foot mill lengths offer flexibility, eliminating both welds and scrap	1—60" casting required additional welded joints
2—Shape offers lack of porosity	2—Casting gave porosity problem
3—Shape straightness is superior to casting, giving better electrical contact	3—Bow in casting presented difficulty when fastening screen firmly to contact
4—Higher cost per foot, but cheaper over-all installation	4—Initial cost was lower, but additional welds and scrap resulted in higher final cost, and an inferior finished product

REVERE COPPER AND BRASS INCORPORATED
Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.
Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.

COPPER • BRASS • 18 01 • REVERE • ALUMINUM



Electrostatic Spray System Provides Ionized Paint Mist

Designed for paint-spraying applications, electrostatic spray system called Ionic is powered by a 140-kvp power supply. System utilizes a conveyor which forms almost a closed loop around "Ionic" gun which, mounted in loop center, reciprocates vertically.

A cone of disk-shaped ionizing electrode is attached to gun nozzle. Spray pattern, which can be adjusted to furnish either 360° or umbrella-shaped pattern, is set so that spray will hit the cone-shaped electrode and deflect off in mist form. Ionized mist is attracted to work being processed, which is at ground potential on the conveyor.

Scientific Electric, Ionic Spray Div, 105-119 Monroe St, Garfield, NJ

Bench Oven Has Large Work Area

Model 333 for baking, dehydrating, drying, preheating, has working space of 36 x 36 x 36 in. Temperature range is 100 to 350 F.

Features include uniform temperature throughout by means of fan-driven, forced air circulation; adjustable damper that gives wide range of constant temperature; Inconel sheathed tubular heating elements; removable shelves. Outside cabinet dimensions are 40 x 40 x 43½ in. high. Available 220 v, 1-phase, 60 c, or 220/3/60, or 440/3/60.

Grieve-Hendry Co, 1401-17 W Carroll Ave, Chicago 7, Ill

Rockford Planer Drive Centralizes All Controls

H-3 planer drive has been refined by the addition of a hydro-electric control, called Elecdraulic, which makes it possible to actuate or control all table and feed movements of the machine from the planer pendant. Drive combines efficiency of single-circuit planer with the speed required for carbide planing. Solenoid-operated selector valves direct oil from pump to either cylinder, or both in combination.

Electrically operated servo pump control for speed range and cutting speed adjustments is controlled by pendant. Direct-reading tachometer gives cutting speed of table at any time. Return speed is independent and infinitely adjustable.

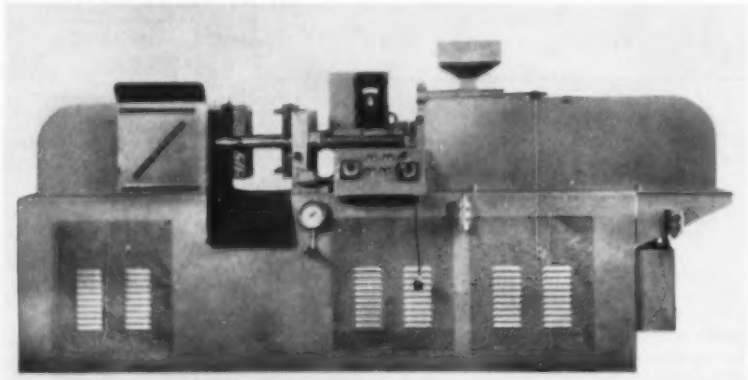
Cutting speed may be increased or decreased from pendant while machine table is running. Stepless adjustment in all ranges is available. Other pendant-actuated controls: feed actuation, at start or end of cutting stroke; inch control of table in cut or return; predetermined fixed inch speed for setup.

Rockford Machine Tool Co, Dept A, Rockford, Ill

Plug gage available in size range from 0 to 1½ in. is truncated, with truncations extending one-half the length on the major diameter of both ends. Remaining portions are full form, and pitch diameter is constant for the full length of each member. Tolerance of pitch diameter is minus on the "Go" and plus on the "No Go." In use, ring gage is first set to the full-form portion of the setting plug for accuracy; then by moving ring gage onto the truncated section of the plug, it will check for wear or correctness at the pitch diameter. Catalog 875G.

Besly-Metro Div, Besly-Welles Corp, Dept TSP, South Beloit, Ill

GAGE checks squareness of face and concentricity of aircraft cylinder hold-down bolts. Three checks are made: size of 7/16-20 NF-3 threads; concentricity of 0.435-0.434 dia in relation to thread; and checking under face squareness of bolt-head bearing surface in relation to thread—*Bryant Gage & Spindle Division, Box 620, Springfield, Vt*



SEMI-AUTOMATIC INJECTION MOLDER in horizontal version has a molding capacity of 2¾ oz, which can be raised to 5 oz with pre-packing. Press is furnished in two models: Model 356A has injection pressure capacity to 10,000 psi; Model 356 has maximum pressure up to 20,000 psi. Plasticizing capacity is 30 lb per hr with 10 operating cycles per min for 356A, 7 cycles for 356. Machines handle molds up to 12 x 12 in. and have casting area of 30 sq in.—*Clifton Hydraulic Press Co, 291 Allwood Rd, Clifton, NJ*

YOU ASKED FOR IT

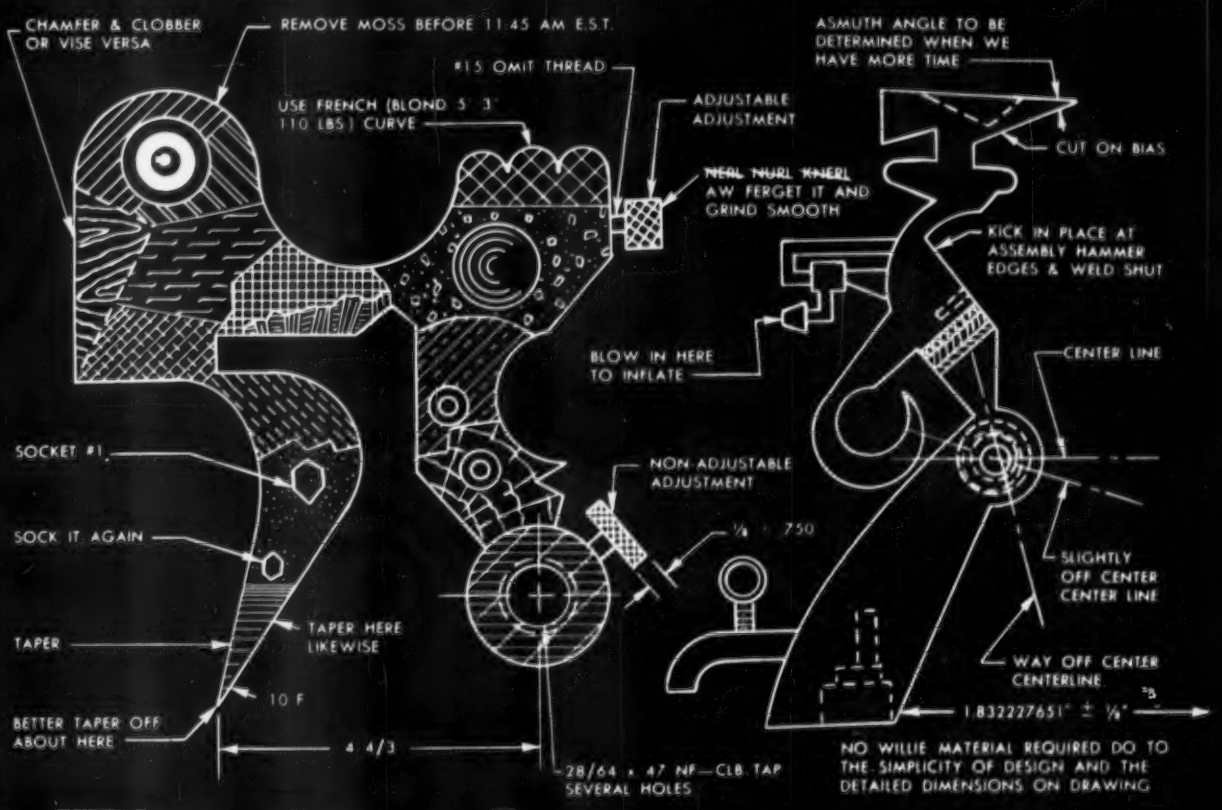
Answering your request is our pleasure. Whether for a special purpose valve or—in this case—the front cover of the ROSS EnginAIR, our bi-monthly technical publication, a re-print of which so many of you have asked for. Additional reprints on request.

Ross OPERATING VALVE COMPANY
122 E. GOLDEN GATE AVE. • DETROIT 3, MICHIGAN

ROUTE TO:

RETURN TO:

Ross enginair


CHAMFER & CLOBBER OR VISE VERSA
REMOVE MOSS BEFORE 11:45 AM E.S.T.
#15 OMIT THREAD
USE FRENCH (BLOND 5' 3" 110 LBS.) CURVE
ADJUSTABLE ADJUSTMENT
NEAL NURL KNERL AW FERGET IT AND GRIND SMOOTH
ASMUTH ANGLE TO BE DETERMINED WHEN WE HAVE MORE TIME
CUT ON BIAS
KICK IN PLACE AT ASSEMBLY HAMMER EDGES & WELD SHUT
BLOW IN HERE TO INFLATE
CENTER LINE
SOCKET #1
SOCK IT AGAIN
NON-ADJUSTABLE ADJUSTMENT
⅛ - 750
SLIGHTLY OFF CENTER CENTER LINE
TAPER
TAPER HERE LIKEWISE
10 F
BETTER TAPER OFF ABOUT HERE
4 4/3
WAY OFF CENTER CENTERLINE
1.832227651° ± ⅛°
28/64 x 47 NF—CLB. TAP SEVERAL HOLES
NO WILLIE MATERIAL REQUIRED DO TO THE SIMPLICITY OF DESIGN AND THE DETAILED DIMENSIONS ON DRAWING

BIRDS EYE VIEW

WORMS EYE VIEW

MIGHTY DIM VIEW

BUGS TO BE ELIMINATED AT FINAL ASSEMBLY

CAUTION
KEEP UPPER BOTTOM RIGHT HAND CORNER OVER ABOUT ⅛ LOWER THAN LEFT HAND CENTER CORNER WHICH SHOULD BE DOWN A LITTLE HIGHER THAN MIDWAY APPROXIMATELY

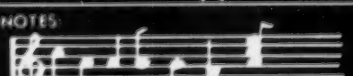
INSTRUCTIONS
A DIAMETER WAITING APPROVAL OF SOME TWO BIT CLERK IN THE OFFICE OF SHAPE STANDARDIZATION

W
N E
S

THIS IS HOW TWO LINES OF PRINTING LOOK WHEN PRINTED UPSIDE DOWN

PREPARED BY: Ross OPERATING VALVE CO.

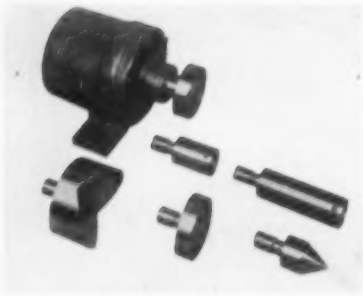
NOTES:



ANY SIMILARITY BETWEEN THE MACHINE AND ANY IDENTICAL MACHINE IS PURELY INCONSEQUENTIAL

SPRING FEVER—DRAFTSMAN'S STYLE

HG LW CM



Universal Air Fixture Lock Provides Instant Clamping

Reportedly adaptable to any machine in a plant, universal air fixture lock can be used on such applications as locking work in position for machining operations, moving one part of a fixture against another, pushing work into cutters, loading or ejecting work, pressing parts into work, and moving parts of a machine.

Air cylinder on the fixture lock is machined to receive five interchangeable holding tools, which have ½-in. undercut adapter shanks and can be locked in place with a 3/32-in. socket set key. Cylinder can be mounted in any position, and comes in three sizes, with rated locking forces from 650 to 2300 psi and power strokes from 1⅞ to 3⅛ in.

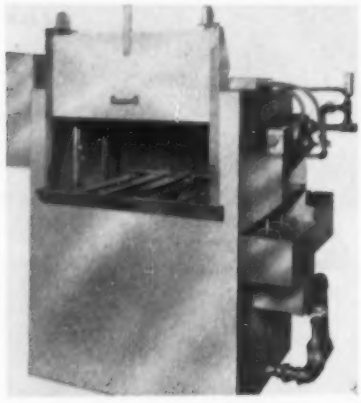
Wilton Tool Mfg Co, Inc, Schiller Park, Ill

Standard Shank Boring Bars Have Two Square Toolbit Holes

Both 90° and 30° toolbit holes in the same bar permit rough and finish spot facing, back spot facing, bottom boring, through boring, counter boring and back counter boring operations.

Bars are available with Nos. 4 and 5 Morse taper shanks for use on radial drills, tailstocks of lathes, turret lathes, boring mills, jib borers, as well as horizontal and vertical milling machines. Use of reducing sleeves permits adaption to machines with spindles other than Nos. 4 and 5 Morse tapers. Bars are designed to use any standard toolbit.

Beaver Tool & Engineering Corp, Box 429, Royal Oak, Mich

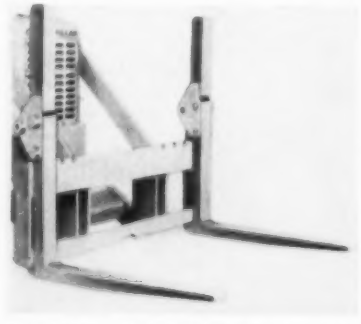


Automatic Cycle Offered in Ransohoff Cleaning Machine

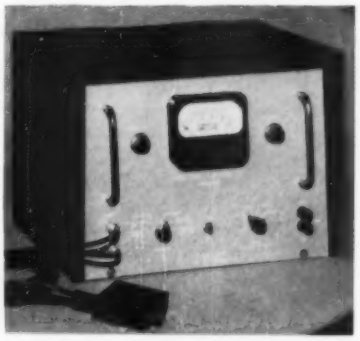
Ransomatic small-parts washer automatically cleans two baskets of parts in one load. Baskets are loaded into cabinet and door is closed, starting cleaning cycle in the following sequence: hot, recirculated cleaning-solution spray for 30 sec, hot-water rinse spray for 60 sec, and a drain-dry period of 90 sec.

Machine is designed so that wash, rinse, and drain-dry periods are adjustable over a wide range. At completion of cycle, door automatically opens and baskets or racks of parts are unloaded by operator.

Ransohoff, Inc, 1001 Ford Blvd, Hamilton, Ohio



FORK-LIFT ATTACHMENTS for No. 955 and No. 933 Caterpillar Traxcavators have a carriage which attaches to the lift-and-tip arms in place of the bucket. Tines are mounted on this carriage and can be adjusted horizontally to three different width spacings. Adjustable standards, which can be set in either a vertical or 35° forward position, are located at the top of the tines—*Caterpillar Tractor Co, Peoria, Ill*



Surface Vibration Calibrator

ACF Model 501 calibrates vibration pickups or measures vibration of non-magnetic, metallic surfaces.

Probe, containing a transducer excited by a high frequency signal, is placed proximate to vibrating surface. Variations in spacing between probe and surface cause a variation of mutual inductance in the transducer. After suitable detection and amplification, variations are represented accurately as displacements on meter of calibrator.

Instrument measures vibration amplitude over four decade scale ranges from 20 mu-in. to 0.02 in. full scale. On all ranges readings are independent of frequency from 10 to 20,000 cycles per second. Accuracy is reportedly better than 5% of full scale in measurement of sinusoidal or nonsinusoidal waveforms.

ACF Electronics, 800 N Pitt St, Alexandria, Va

FASTENING TOOL called Shure-Set enables worker manually to drive a fastener through ¼-in. steel. Device can handle a wide variety of fasteners in the ¼- and 3/16-in. sizes. Fastening pin is inserted in tool, which is then placed against work; head of tool is then struck, driving pin into work. Tool is offered in a kit, together with drive rods, collars, and studholders, for $27.95—*Ramset Fastening System, Olin Mathieson Chemical Corp., Cleveland, Ohio.*

NOW...for every production need there's a

Morris

MOR-SPEED

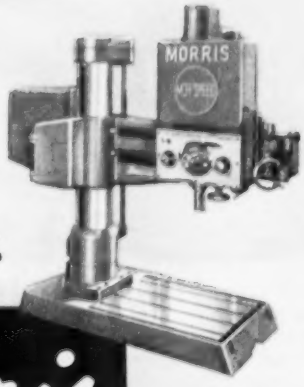
Radial Drill

RUGGED 9"–11" **radial drills**
with centralized controls

Every control in sight, within reach, easy to operate, fumble-free. Rugged construction, massive rigidity. Exceptional balance, plus accurate spindle speed and feed, assures maximum operating precision.

There's a Morris Mor-Speed Radial Drill to satisfy your most exacting specifications. Write for complete detailed information and prices!

THE MORRIS MACHINE TOOL CO.
933 Harriet St., Cincinnati 3, Ohio



NEW 13"–15"
hydrapower radial drills
with preselective settings

The ultimate in drilling speed and operational ease. Hydraulically powered, push button operated features include: head traverse; gear shifting; arm raising, lowering, clamping, unclamping; column and head clamping. Preselection of spindle feeds and speeds while drill is in action.

Builders of MOR-SPEED Line

Morris

Red Ring Gear Speeder Makes Production Sound Tests

Model GSR gear speeder handles the smaller sizes of pinion gears and is completely automatic. Tester includes an electronic "ear" that inspects and accepts or rejects gears, according to their operating sound level.

Gears are automatically loaded, run in both directions in mesh with another gear with and without brake loading, unloaded, and passed or rejected by the electronic sound discriminator, whose microphone is placed near the gear-mesh area. Sound unit may be adjusted at any time to the range of audible noise frequency and intensity desired for rejection.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich

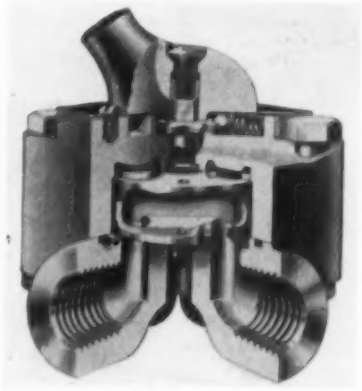
ADJUSTABLE KEYWAY BROACH called Glenny consists of a cylindrical housing with screw cap ends, accommodating an interchangeable blade. Turning the opposing caps moves an internal ramp which adjusts the blade protrusion for successive cuts. Tool will cut single keyways or 4-slot splines in either of two slot widths, in either of two diameter holes, with an accuracy of 0.0005 in.—*East Shore Machine Products Co, 50 E 201st St, Cleveland 23, Ohio*

Automatic Infeed Attachment Boosts Grinder Production

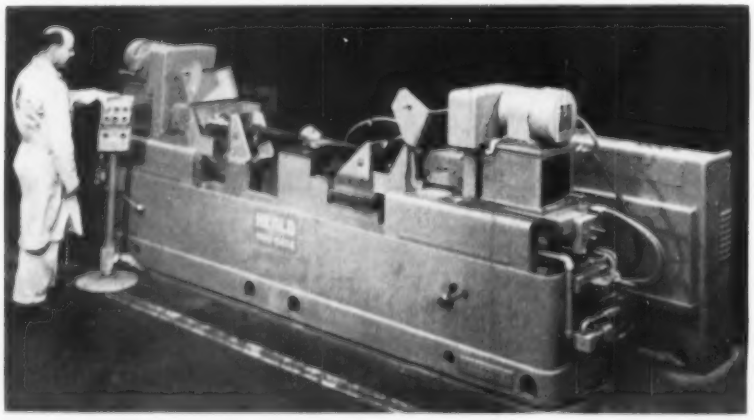
Called Feedcision, attachment for centerless grinders provides automatic infeeds and spark-out timing. Unit is equipped with variable-position stop controlled by a set-screw for removal of grinding stock from 0.005 to as much as 0.040 in. in one cycle. Operator drops work between wheels and presses start button, attachment completes the cycle.

Device is said to increase production considerably, as well as to increase operator safety. Caution lamp glows while machine is in set-up position and also while in grinding cycle. It opens only 0.007 in., so that very small pieces cannot get caught between regulating wheel and work blade.

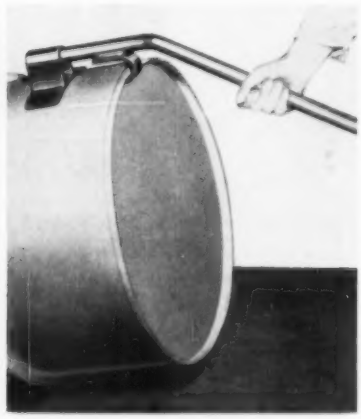
Modern Devices, Box 429, Libertyville, Ill



SEAL-TITE SELECTOR VALVE in the 0 to 1000-psi pressure range gives no-leak service in indexed position in most fluid services. Operating temp range is –65 to 160 F; working pressures: air and gases, 0-500 psi; liquids, 0-1000 psi. Sizes range from ⅛ to 1-in. female pipe—*Republic Manufacturing Co, 15655 Brookpark Rd, Cleveland 11, Ohio*



AUTOMOBILE DIFFERENTIAL HOUSINGS are machined on special Model S Bore-Matic, which performs precision borizing on both ends of a steel workpiece over 4 ft long. Work is held between two angle plate fixtures and is stabilized at its midsection by a horizontal platen. Company reports that, although boring is being done at stations 50 in. apart simultaneously, tolerances and concentricity are held to close limits. Surfaces borized are bearing and oil-seal diameters and adjacent chamfers. Production at 70% efficiency is 36 housings per hr—*Heald Machine Co, Worcester 6, Mass*



DRUM UPENDER NO. 32 has a 40-in. handle, offset 35° for raising loaded drums from horizontal to vertical. A 1¼-in. hook provides adequate clearance for largest chime; 2½ x 8-in. toe plate spreads lifting pressure—*Morse Manufacturing Co, 727 Manlius St, East Syracuse 2, NY*

IN INLAND STEEL'S ROLL DEPARTMENT

New Mack-Hemp electronic contouring lathe removes metal at peak rates with .001" accuracy

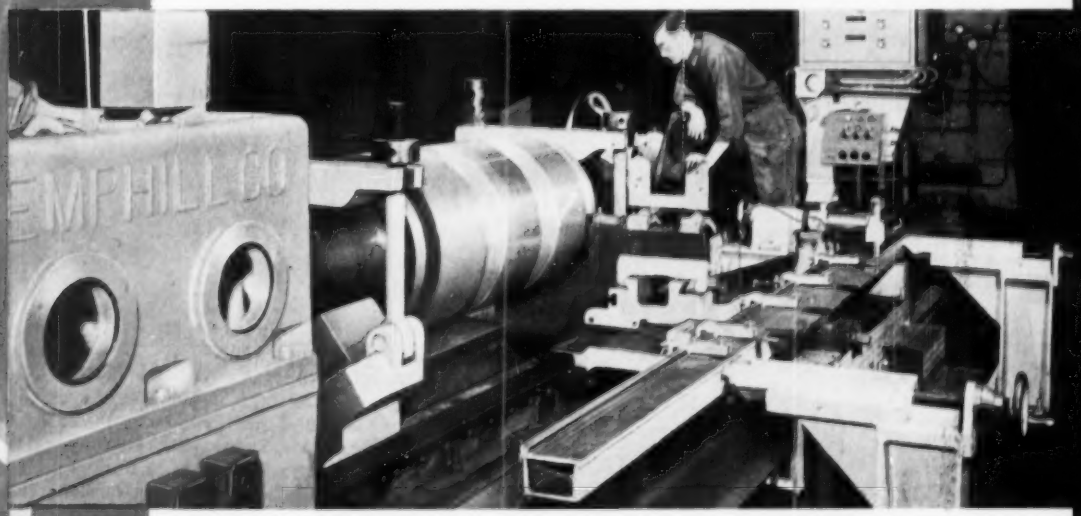
An electronic "pilot" guides this 48" Mackintosh-Hemphill contouring lathe recently installed in the Roll Department at Inland Steel Company's Indiana Harbor Works. It is so precise that the lathe can finish contours into a roll without deviating more than .001" from the pattern on the full-size template.

Stylus contact with the template controls the lathe's longitudinal- and cross-feed motors through electronic linkages. Thus, dual feed motion response of the tool holder carriage is instantaneous and smoothly continuous. Any conventional groove shape can be duplicated—it is even possible to make an accurate cut on a shoulder vertical to the axis of the roll.

But this precision of control is only one reason why the big lathe can turn shape rolls so rapidly. It has been designed and built to handle some of the heaviest torsional loads ever imposed on a lathe. For example:

It can operate continuously through a ⅞" cut depth with feeds between .060" and .100", and with spindle speeds up to 62 RPM. It can turn rolls or forgings 50" in diameter and 18 feet long.

If you are planning to install new large-roll turning capacity, you'll be wise to investigate these cost-cutting automatic contouring lathes. Write us today for complete information. They're available in 48", 60" and 72" sizes.



Inland's new 48" Mack-Hemp automatic lathe here is cutting passes into a new roll for a 3-high structural mill that rolls 15" I-beams. Hardness of the roll is 42 Shore.

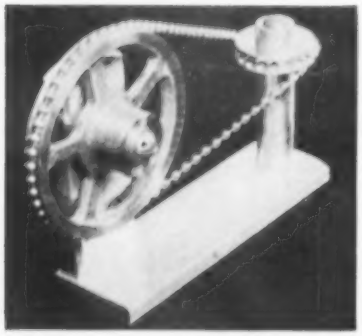
MACKINTOSH-HEMPHILL
DIVISION OF
E. W. BLISS COMPANY

Makers of the rolls with the Striped Red Wabblers

901 Bingham Street, Pittsburgh 3, Pa.

cast mill rolls • Johnston cinder pots • rotary tube straighteners • end-thrust bearings
heavy duty lathes • steel and special alloy castings

MACKINTOSH-HEMPHILL DIVISION · PITTSBURGH, U.S.A.
BLISS

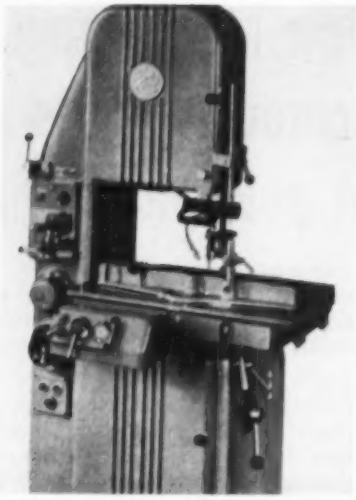


Bead Belt Drive Eliminates Gearing

Drives consist of bead chain and sprockets which provide positive synchronous drives. Considerable misalignment between shafts can be tolerated, according to manufacturer, permitting wide variety of configurations without need for bevel gears, universal joints, or other devices.

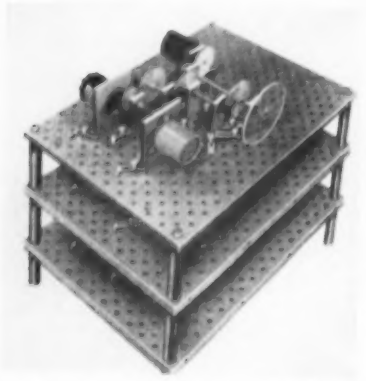
Variety of sprockets are available for use with No. 3, 6, 10, and 13 qualified bead chain. Sample kit, including different sprockets for No. 6 chain (⅛-in.-dia beads, 72 beads per ft), 10 feet of chain, and connectors for making endless belts is available at $5.

Voland & Sons, 32 Relyea Pl, New Rochelle, NY



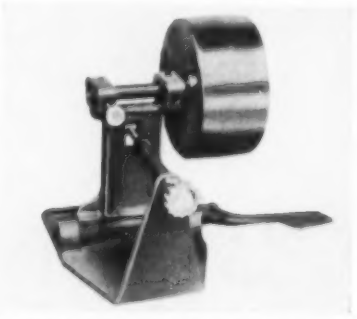
VERTICAL-CUTTING BANDSAW, Kolle Model K-16 from West Germany, is a contour-cutting machine with infinitely variable cutting speeds from 33 to 2400 fpm. Table swivels 15° on all four sides. Other features include hydraulic attachment for infinitely variable feeds, welded-steel construction, illuminated magnifier, blade shear, and circle-cutting attachment—*Imported by Aaron Machinery Co, Inc, 45 Crosby St, New York 12, NY*

LARGE CONTROL PANEL is designed for the automatic control of solution temperatures in the anodizing of automobile grilles. Conditions requiring temperatures ranging to 300 F can be achieved automatically. Unit connects a battery of electric heaters capable of generating heat in excess of 350,000 watts. Controls also permit automatic opening and closing of motor-driven valves for supplementary steam heating and water cooling, permitting a constant temperature range, varying only 10 F, between 240 and 250 F. Normal working requirements run about 1000 amp—*Frederic B Stevens, Inc, 1800 18th St, Detroit 16, Mich*

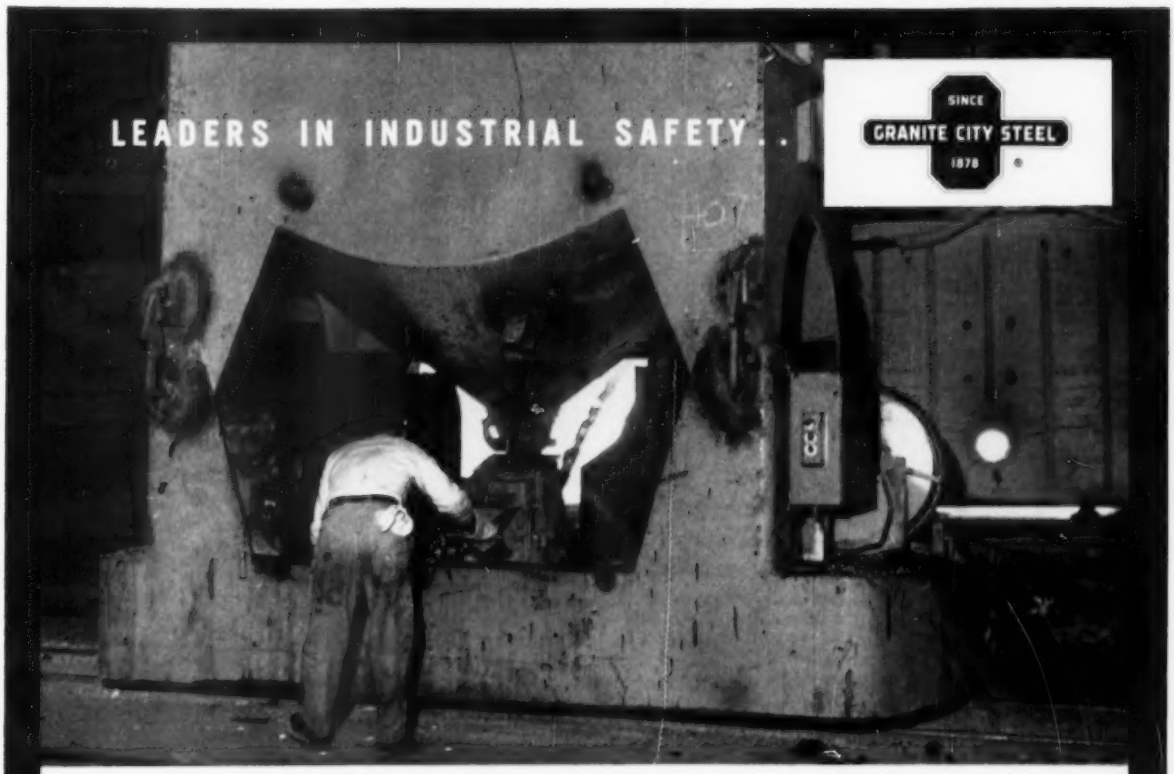


ELECTRO - MECHANICAL ASSEMBLY KIT called Servoboard has been redesigned to include many additional parts. Holes in mounting board are tapped, and hanger mounting clamp is one-piece unit with captive screw. Leg design allows stacking of several boards. Fourteen component hangers and four blank hangers accommodate electrical components. Three kits are available for simple arrays general requirements, or extensive use—*Servo Corp of America, 20-20 Jericho Turnpike, New Hyde Park, LI, NY*

COMBINATION MASTER CONTROL called Trippit is designed for use with power presses, shears, and brakes. Device, shown complete with accessories, includes control box, safety hand trips, electric foot trip, clutch actuator, limit switch, keys, die switches, and sockets. Functions performed include automatic tripping by piece part, automatic gaging, elimination of rejects, counting, and shutting off after pre-set count. Electro-mechanical device installs in one hour, contains no tubes, condensers, or resistors. Safety features include two-hand "can't cheat" control and die protection (parts must nest perfectly or press will not trip). Control is a product of General Automation Corp of New York—*Distributed by Product Design Engineers, 65 S Broadway, Yonkers, NY*



BACKSTAND IDLER, Model BS, is available for 4-, 6-, or 8-in.-wide belts, and can be easily set up as the belt idler for any grinding or polishing lathe. Design provides a foot pedal for belt-tension release, leaving both hands free for changing the belt. Sealed ball bearings in the 10-in.-dia pulley provide long life and speeds up to 10,000 sfpm. Unit can be mounted on floor, pedestal, or wall. Sufficient adjustment to compensate for use of different-diameter wheels is provided, so that belt speeds of 5600 to 7500 sfpm are possible with a single-speed 1800-rpm lathe. Optional features include remote tracking control and pneumatic tensioning. Bulletin A1381—*Curtis Machine Corp, Jamestown, NY*



GIANT DOLOMITE SLINGER at Granite City Steel Co. helps prevent slag from burning through furnace bottoms and walls. *It could be a dangerous source of plant fires!* GCS prevents fires by powering the machine with fire-resistant Pydraul hydraulic fluid—a good example of the progressive safety program at the "Steel Center of Mid-America," Granite City Steel Company.

Pydraul Protects Hydraulic Operation at Granite City Steel

At Granite City Steel, Pydraul is the ideal hydraulic fluid for use in the hydraulically operated *dolomite slinger* shown above. Although this slinger is used at the mouth of open hearth furnaces, there is little danger of hydraulic fire because Pydraul is fire-resistant.

Pydraul's claim to safety and dependability has been proved not only at Granite City but by 275 million hours of fire-safe operation in plants everywhere.

Pydraul gives you more than safety. You can be sure of long equipment life with low maintenance . . . because Pydraul lubricates like a premium petroleum oil. You'll save money on fluid make-up, too! Pydraul is reclaimable—you can return spillage to the system, use it again and again.

If your hydraulic equipment is near hot metal, electrical contacts, open flame or other heat sources, you may be taking a needless fire risk. Your Monsanto representative will be happy to show you how easy and economical it is to convert to a fire-safe Pydraul system.

Write for Pydraul F-9 booklet. Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Dept. PYD-3, St. Louis 1, Missouri.

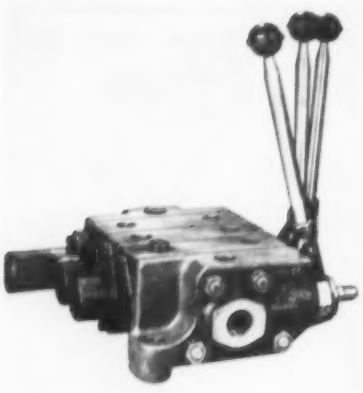
Pydraul: Reg. U. S. Pat. Off.

Pydraul F-9—first and only hydraulic fluid listed by Underwriters' Laboratories, "In respect to fire hazard, Pydraul F-9 is rated by Underwriters' Laboratories, Inc., 2 to 3 in a class much less flammable than paraffin (Petroleum) oil, according to a schedule in which Ether is rated 100; Gasoline 90-100; Alcohol (ethyl) 60-70; Kerosene 30-40; Paraffin Oil, 10-20."

LISTED UNDER REEXAMINATION SERVICE UL OF UNDERWRITERS' LABORATORIES, INC.

MONSANTO

Where Creative Chemistry Works Wonders For You



2000-lb Hydraulic Control Valve

Multi-directional sectional hydraulic control valves for continuous duty at pressures up to 2000 psi are available with ½, ¾, or 1-in. work ports, with nominal capacities of 20, 35, or 60 gpm respectively.

Positive "no load-drop" non-constricting check in each operating action section, combined with a design permitting smooth throttling, makes possible the operation of two or more valve sections simultaneously. Additional features include greatly reduced resistance to flow through internal passages, sealing by O-rings instead of gaskets, and a cartridge-type relief valve.

Commercial Shearing & Stamping Co, Youngstown, Ohio

Drum and Barrel Truck Simplifies Pallet Loading

Shoes of the Ezy-Rol Barrel Cart can be placed on edge of the pallet so that drum can be elevated in one forward motion, or lowered from pallet with minimum of operator effort.

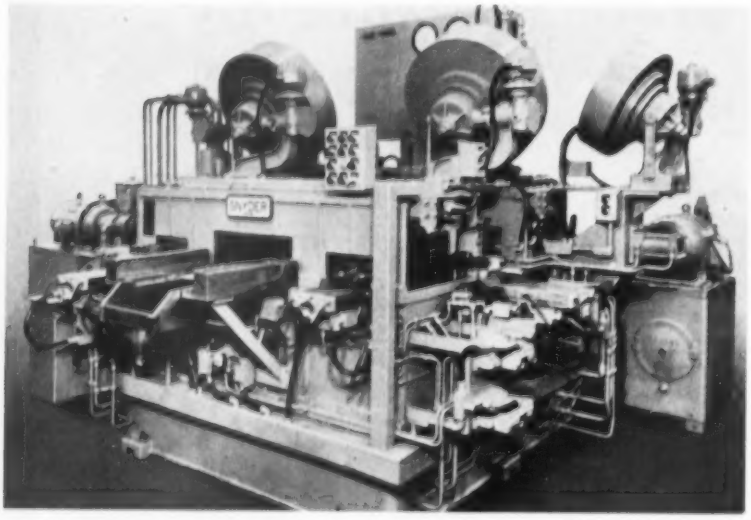
Spring-operated chime hook drops over the barrel edge as truck is moved against it, without operator touching either hook or barrel. Frame can be furnished in heavy steel tubing or aluminum. Solid rubber tires or pneumatic wheels are optional.

Valley Craft Products, Inc, Division of O'Neil-Irwin Mfg Co, 770 Jefferson Ave, Lake City, Minn

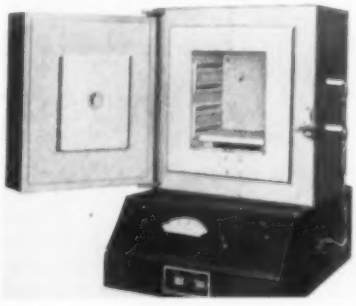
Danly Dual Air Valve For Press Operation

Valve, designed to actuate clutch and brake of mechanical power presses, is available in a new model. Improved design feature eliminates accidental stroking due to valve failure. Unit consists of two valve elements working independently in parallel, and cross ported with extra large exhaust outlets. Should either element fail, clutch will be exhausted and disengaged normally through the second valve element. Safety factor is reportedly not dependent on mechanical life. Details in bulletin 1902B.

Danly Machine Specialties, Inc, 2100 S Laramie Ave, Chicago 50, Ill



AUTOMOTIVE-ENGINE CYLINDER-HEAD PARTS are handled on automatic assembly machine that applies sealer material and assembles three welch plugs. Unit also air tests the finished assemblies and rejects sub-standard heads. The 7-station, in-line transfer machine is loaded from a conveyor and assembles 130 heads per hr at 80% efficiency. Centralized lubrication system is provided for unit, which occupies floor space about 14 x 14 ft—*Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich*



Small Furnaces

Dyna-Trol units, adaptable to small heat-treating applications, have temperature range from 300 to 2000 F in one series, and 400 to 2300 in another. Heat-up time is one or one and a half hours. Some units operate on 110v, and plug in.

Sizes are 4½ wide, 4½ high, 6 in. deep in two models, and 6 x 6 x 6 in two others. Temperature may be held at any desired level within temperature range of furnace by input controllers which may be set at from 7 to 100% of input.

L & L Manufacturing Co, 136 8th St, Upland, Del Co, Penna

Unit saves 2¼ man hours on each shaft machined from

OSTUCO TUBING

VERTICAL TRACTION SHAFT

Unit Crane & Shovel Corporation, Milwaukee, "lowered the boom" on costs by using OSTUCO tubing for vertical traction shafts in its line of heavy construction equipment. By eliminating a center-boring operation, Unit *saved 2¼ hours machining time on each shaft.*

OSTUCO tubing has tremendous strength to absorb the constant shock and strain to which Unit equipment is normally subjected and machines easily to precision tolerances.

Cash in on the economy of OSTUCO'S unique "Single-Source-Service"—complete tubing facilities "under one roof"—by contacting your nearest OSTUCO sales office.

OSTUCO TUBING

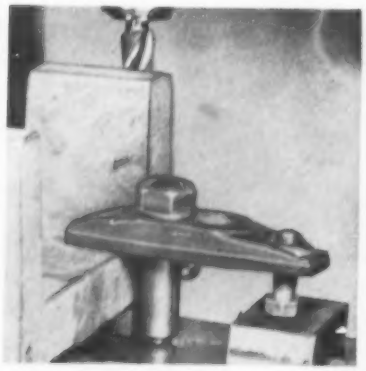
SEAMLESS AND ELECTRIC-RESISTANCE WELDED STEEL TUBING—Fabricating and Forging

OHIO SEAMLESS TUBE DIVISION
of Copperweld Steel Company • **SHELBY, OHIO**
Birthplace of the Seamless Steel Tube Industry in America

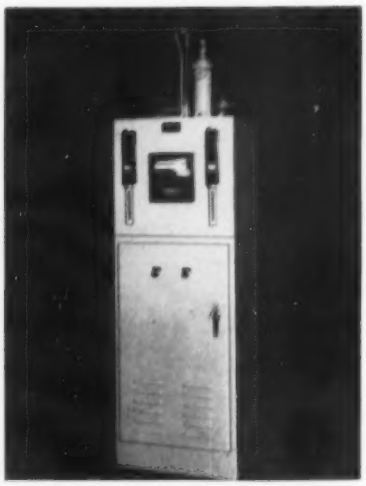
SALES OFFICES: BIRMINGHAM • CHARLOTTE • CHICAGO (Oak Park) CLEVELAND • DAYTON • DENVER • DETROIT (Ferndale) HOUSTON • LOS ANGELES (Beverly Hills) • MOLINE NEW YORK • NORTH KANSAS CITY • PHILADELPHIA PITTSBURGH • RICHMOND • ROCHESTER • ST. LOUIS ST. PAUL • SALT LAKE CITY • SEATTLE • TULSA • WICHITA

CANADA, RAILWAY & POWER ENGR. CORP., LTD.

EXPORT: COPPERWELD STEEL INTERNATIONAL COMPANY
225 Broadway, New York 7, New York

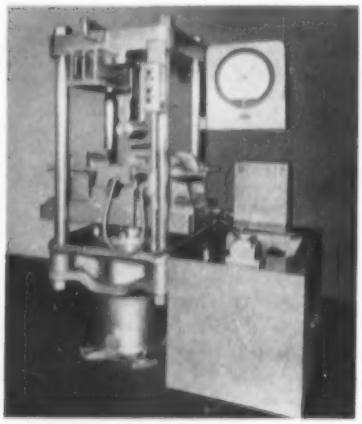


QK HOLD-DOWN CLAMP adjusts up and down to fit wide range of work. One end is conventional design, other is special to fit into small slots and recesses. Full thread engagement is maintained by stopping action of a snap ring on end of T-bolt. Threaded holes in both ends permit leveling. Available in six sizes with smallest telescoping from 9/16 to 27/16 in., largest from 2¼ to 5¾ in.—*Jergens Tool Specialty Co, 712 E 163rd St, Cleveland, Ohio*

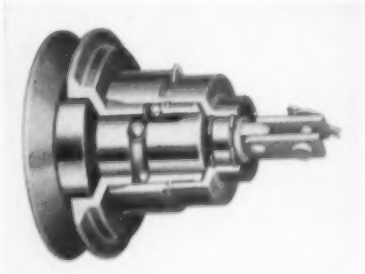


ENDOTHERMIC GENERATOR, Model G-150-E, is laboratory-size unit with rated output of approximately 150 cfh of endothermic atmosphere gas. Designed for use with company's Model RT-25 laboratory furnace, unit can be used with any controlled-atmosphere furnace of proper size—*Ipsen Industries, Inc, 715 S Main St, Rockford, Ill*

DUMPING APPARATUS line includes low, standard, and high level, and dumb waiter types with dump heights from 12 in. on low level unit to max ceiling height on high level models. Lift speed for cable models is from 20 to 50 fpm; tilt speed on hydraulic units is from 20 to 30 sec for dump cycle time. Capacities are 1000 to 5000 lb—*Material Transportation Co, 400 N Michigan Ave, Dept 15, Chicago 11, Ill*



COLD-BENDING TESTS under loads up to 150,000 lb can be made on testing machine designed to handle low-carbon steel bars up to 2 in. square in lengths of 5 to 24 in. Unit also accommodates flats up to 4 in. wide and 1 in. thick in same lengths. Bending press is hydraulically operated at table speeds of 1½ to 10 ipm. Max upward stroke is 11 in. Loads are measured by an Emery bourdon tube system with a 12-in.-dia dial graduated in 500-lb divisions. Machine features sliding platens which can be used to bend specimens 180° or flat on themselves—*Baldwin-Lima-Hamilton Corp, Philadelphia 42, Penna*



V-Belt Drive Clutch

New end-thrust series is for applications on any V-belt drive to 7½ hp. Units mount on electric motors and gas engines, and are adaptable to pumps, gear reducers, coiling and packaging machines, and for intermittent and high-speed clutching.

Clutches consist of three basic parts: central hub and end disk and an idler bearing onto which the slack belt drops when clutch is disengaged; slideable pulley side that moves in or out to effect engagement or release; outer sleeve or cam which restrains and applies pressure to the balls, and also carries thrust ball bearing element which actuates clutch. Units now in use are being actuated up to 800 times per hour.

V-Belt Clutch Co, Los Angeles, Calif

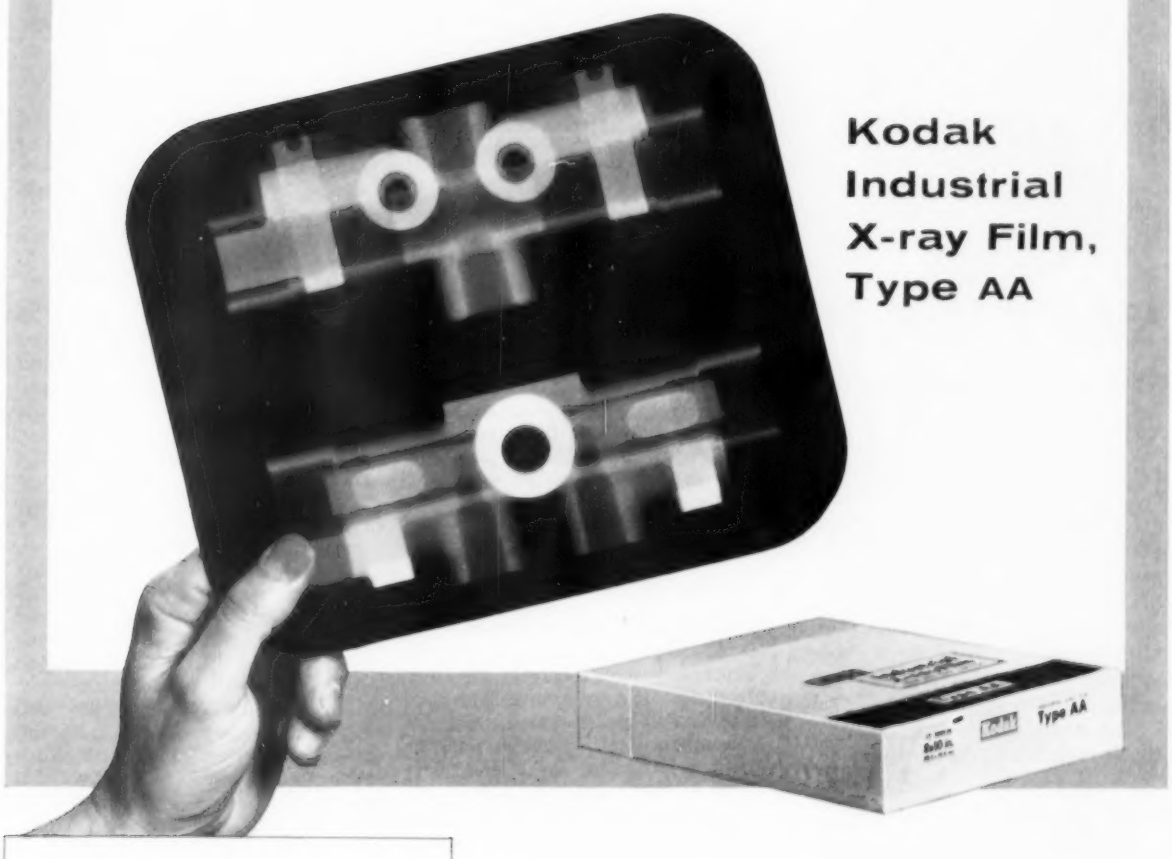
FLEXIBLE-SHAFT MACHINE, Model SJ38, is mounted on a pan-and-caster base with a carrying handle on top of motor. Flexible shaft transmits up to 1/3 hp. Speeds of 1000, 1750, and 3000 rpm may be obtained. Unit can be furnished with 5- or 6-ft flexible shaft can be used for buffing, sanding, wire brushing, drilling, reaming, and grinding—*Stow Mfg Co, 29 Shear St, Binghamton, NY*

Expandable bench system, called Product-A-Flow, with interchangeable members—work panels, legs, telescopic support frames—can be locked together in any arrangement, in-line, back-to-back, right angle, or combinations. Re-arrangement is accomplished by unlocking a few bolts.

Products For Industry, 49 Washington Ave, Stamford, Conn

New X-ray Film

gives greater detail with usual exposure times



Kodak Industrial X-ray Film, Type AA

Read what the new Kodak Industrial X-ray Film, Type AA, will do for you.

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under shop conditions of use.

Now your x-ray dealer can supply you with this new x-ray film that gives you greatly increased speed. This gives you the opportunity of using reduced kilovoltage to obtain greater radiographic contrast, and easier readability with established exposure times.

And in addition to ranging up to more than double the speed, this new film retains the fine sensitivity characteristics which have made Kodak Type A the most widely used x-ray film in industry.

Kodak Industrial X-ray Film, Type AA, will save you time. It can produce finer work. Get in touch with your x-ray dealer or Kodak Technical Representative and see how.

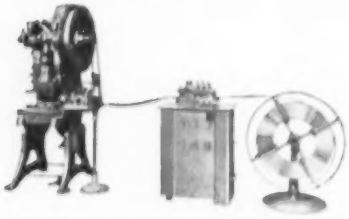
EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Kodak
TRADE MARK

FLEXIBILITY
in Stock Straightening

WITTEK
STOCK STRAIGHTENERS

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.



This typical Wittek automatic production feeding setup includes—Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.

Write for full particulars

WITTEK Manufacturing Co.

Production Feeding Equipment

4320 W. 24th Place • Chicago 23, Illinois

Powder-Metallurgy Compound Developed for Bearing Material

Compo E, developed for production of lowcost, oil-retaining bearings, has been introduced to supplement the company's Powdiron sintered iron and Compo porous bronze.

Composed of approximately equal parts of iron and bronze, it combines the economy and strength of the one with the anti-friction, long-life properties of the other. Although primarily intended as a general-purpose bearing material, it can also be fabricated into sintered structural parts.

Bound Brook Oil-Less Bearing Co, Bound Brook, NJ

Aluminum-silicone paint called Alumicone is reported to withstand temperatures in excess of 1500 F. Containing aluminum pigments supplied by Alcoa, product has a silicone-alkyd resin base. For use wherever high temperatures deteriorate normal paint films, paint can be sprayed or brushed directly onto the metal. No special primer is needed.

Atech, Inc, Toledo, Ohio

Thermal Cutout Protects Drive Against Damage From Overheating

Dodge thermal cutout is designed to protect its Flexidyne dry fluid drive against overheating. If an overload causes prolonged slipping, and consequent heating, device trips the switch, cutting off power and, if desired, giving an alarm.

Mounted on the side of the drive, it contains a trigger spring held down by an alloy thermal pin. Before the Flexidyne can heat up enough to cause any damage, pin will melt, allowing trigger to spring out so that it will push the non-sparking striker of the special switch to the "off" position.

Dodge Manufacturing Corp, Mishawaka, Ind

Structural adhesives, known as Lefkoweld, for general and special purpose bonding of rigid materials have been formulated to meet tensile requirements of MIL-A-5090B for aircraft structural assemblies. They are said to provide full-strength service over wide temperature range, are easily handled on complex contours, and are completely solvent-free.

Leffingwell Chemical Co, Perry Annex, Whittier, Calif

Automatic battery charger is used for maintaining utility batteries at full charge, ready for service when needed. Automatic in operation, unit extends battery life and reduces maintenance by eliminating gassing and water loss. Rectifier power circuit is full wave. Automatic regulation circuit is a high-gain magnetic amplifier which provides output-voltage regulation to within ± 1%. AC input-line voltage changes of ± 10% are automatically regulated. Selenium rectifier stacks have inorganic, non-oxidizing barrier layers which are corrosion- and moisture-proof and are capable of continuous full-load operation in 55 C ambient temperature without deterioration. Charger is available in models with ratings of 3, 6, 12, 30, and 60 amp.

Norma-Hoffman Bearings Corp, Walker Div, Stamford, Conn

Bondable Teflon sheets and tapes have been developed to permit permanent bonding to a variety of materials with conventional commercial adhesives. Good bond strengths have reportedly been obtained between aluminum, mild steel, wood, and Teflon.

Flexrock Co, 3600-A-Filbert St, Philadelphia 1, Penna

E-6012 electrodes, all-position Hobart 212, for ac or dc operation, are said to produce very little spatter even when using amperages higher than normal for this type of electrode. Designed for fast production and fabrication welding as well as maintenance welding; recommended for use where fit up is poor. Available in ⅛, 5/32, 3/16, 7/32, and 5/16-in. sizes packed in 50-lb packages, and 3/32-in. size in 25-lb packages.

Hobart Brothers Co, Troy, Ohio

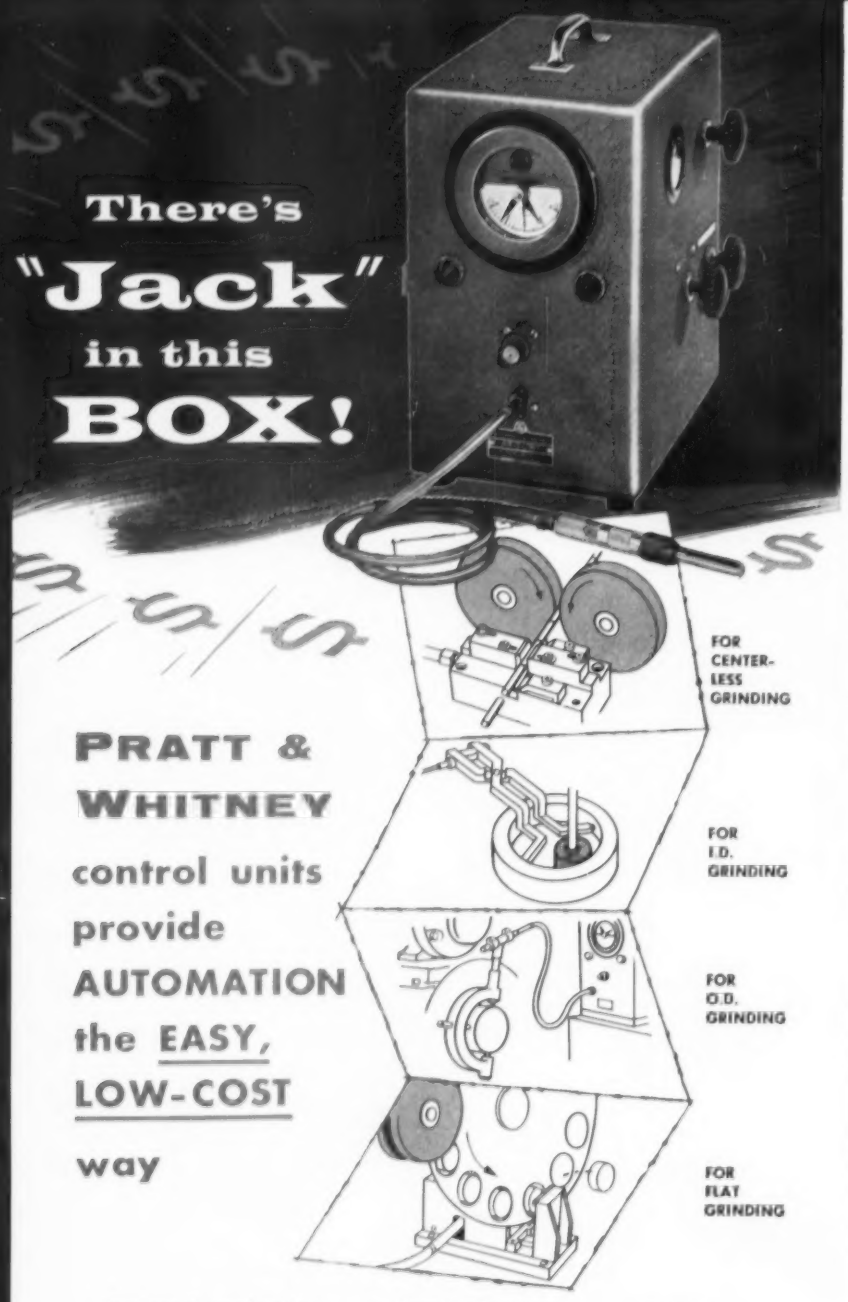
Pressure fluid tank with max working pressure of 110 lb is available in 3-gal. size. Standard models include air regulator with gage, safety valve, air release valve, ¼-in. air inlet and outlet valves, ⅜-in. fluid pipe and fluid valve on cover. A 1-in. bottom fluid outlet is available for heavy compounds.

Paasche Airbrush Co, 1909 Diversey Parkway, Chicago 14, Ill

Producto Guide Pin Has Spherical-Angular Radius

Qwik-Fit guide pin features a spherical-angular radius said to make it impossible for the die-set to cock or jam. Maker reports that guide pins and bushings do not have to be

QUOTATION
QUOTATION
QUOTATION
QUOTATION
QUOTATION
QUOTATION
QUOTATION
QUOTATION
QUOTATION
Which do you buy...
PRICE or VALUE
Why are quotations considered on the basis of price alone, when value is usually the thing being purchased?
The true cost of the gage is the reliability of the supplier, accuracy of gage, and cost per piece inspected.
At The Pipe Machinery Co., gages are made by a team of skilled craftsmen who make the finest gages at a fair cost. We propose that you buy the value that thousands of PMCo customers have found in our gages.
Your inquiry is solicited for the highest value in gages available.
HI-LO SET PLUG
THE PIPE MACHINERY CO
CLEVELAND OHIO U.S.A.
GO
1.3405 PD
P.M.CO
THE PIPE MACHINERY COMPANY
29100 Lakeland Blvd., Wickliffe, Ohio
Greater Cleveland
Today Get the Pipe Machinery Co. Catalog #10. Fill in this coupon.
Name
Company
Title
Address
City
Zone
State



Increased production . . . reduced reject losses . . . greater accuracy! These are the profitable advantages you get through Automatic In-Process Gaging. And now, *standard, on-the-shelf* Pratt & Whitney Control Units . . plus a minimum of special gaging fixtures . . . can give you an in-process gaging installation exactly tailored to *your* needs *without* the long delays and heavy expenses involved in engineering and constructing special equipment.

GET FACTS AND FIGURES . . . Prove how P&W Automatic, In-Process Gaging can improve your profit picture . . . how easily it can be applied to your machines. Phone the P&W Branch Office near you and ask a Pratt & Whitney Direct-Factory Gage Specialist to analyze your needs and submit his recommendations.

PRATT & WHITNEY COMPANY
INCORPORATED
11 Charter Oak Boulevard, West Hartford 1, Connecticut
Branch Offices and Stocks in Principal Cities
MACHINE TOOLS • GAGES • CUTTING TOOLS

carefully lined up in order to assemble die-sets, and that need for hammering the punch-holder down on the pins has been eliminated.

Producto Machine Co, 990 Housatonic Ave, Bridgeport 1, Conn

Portable bar racks for heavy-duty handling and storing of piping and tubing are built to specifications to handle any length and load capacity. Racks have flush bottom and top, full wrap-around crane bars. Items may be stored in multiple tiers to any height using automatic tongs suspended from overhead crane.

Palmer-Shile Co, 16019 Fullerton, Detroit 27, Mich

Milford ground flat stock, requiring no finish grinding, is available in two types of steel, oil hardening, a general purpose electric furnace non-deforming tool steel, and air hardening, where extra resistance to wear is required. Material is supplied in a fully spheroidized, annealed condition for easy machining. Hardness obtainable ranges up to 65 R$_c$.

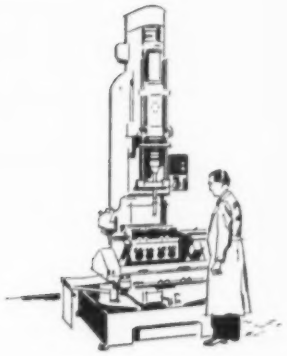
Henry G Thompson & Son Co, Chapel & Mill Sts, New Haven 5, Conn

Foot switch, designated Nautilus, is water-, dust-, oil-, and rustproof. Model WP 541-S has rating of 20A 125-250 VAC, with momentary contact, single pole, double throw; Model WP 541-D has rating of 12A-125 VAC 6A-250 VAC with maintained contact, single pole, double throw. Unit is 8 x 4 x 2¼ in., weighs 2 lb 8½ oz.

Linemaster Switch Corp, 432 Woodstock Terrace, Woodstock, Conn

Hydraulic control cylinder of simple design and leak-proof construction is available under the trade name Hydro-Feed. Attached to any air cylinder, device provides 0 to 4 in. of rapid approach, with infinitely variable feed in one direction and rapid return in the other. Max checking capacity is 3000 lb; longer strokes and larger capacities are available on order. Basic unit has a micro-honed 2-in. bore and 4-in. hydraulic feed. Unit is installed by mounting nose through a ⅞-in. hole and tightening nut. Device requires no make-up fluid or expansion chambers; feed is adjusted by twisting the piston rod. Price is $60.

Rotafeed Co, 2826 E Grand Blvd, Detroit 11, Mich



"Today... Rejection rate is NIL!"

A large Midwest pump manufacturing company had run up against an expensive finishing problem. They were using a super finisher with an abrasive stone to cut and polish 410 stainless steel shafting to a four micro finish. The hardness of the shafting was Rockwell B60-90. Although they tried a number of honing fluids recommended by various companies, the rejection of finished shafting was high and stone life was short. On a routine call, Sinclair Industrial Representative P. W. Stevens was asked for his recommendations.

Light-bodied coolant recommended...

Mr. Stevens reports, "Examination showed the need for a light-bodied coolant specifically designed for use as a honing fluid for both ferrous and some non-ferrous metals. From previous experience with a similar problem, I recommended Sinclair HONOL Medium."

Problem solved...

Mr. Stevens continues, "The company tried Sinclair HONOL Medium on a test basis. A follow-up showed they were getting exceedingly fine finish and accuracy, with sufficient carry-off of steel particles during the honing operation. The amount of heat generated was kept to a minimum, thus preventing distortion of parts. The company reports that today their rejection rate is nil. Moreover, all pieces have the desired four micro finish, and stone life has increased considerably. This manufacturer now specifies Sinclair HONOL Medium for his finishing operations, and uses the same product for honing brass."

Why not let a Sinclair Lubrication Engineer help solve *your* lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N.Y.

SINCLAIR LUBRICANTS

How MICROHONING Makes a Gas-Tight Running Seal Without Piston Rings

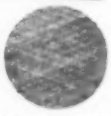
A leak-free, running seal between bores and pistons—without the use of rings—is possible only when the processing method generates diametric and geometric accuracy and the required functional surface finish. These characteristics are simultaneously obtained by the Microhoning process. Here's how:

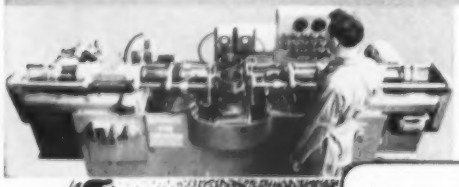
1 The sticks of abrasives in the tool form an abrasive "cylinder" and are fed out radially with equal pressure in all directions. High spots and tight areas in the bore are abraded first.

2 The long abrasive sticks cut only on the crests of wavy or snaky surfaces until the bore has the same diameter throughout its full length.

3 The combination of tool motion (rotation and reciprocation) and feed pressure fractures the abrasive grits that have become dull, and new sharp edges are formed; the clean constant cutting action of every stroke on the full bore length consistently generates the desired surface finish.

One of the exclusive advantages of Microhoning is its ability to produce whatever functional surface characteristics are required for maximum product performance. Microhoning's cross-hatch pattern, with its myriad of minute intersecting "valleys," furnishes an excellent surface for retention of lubrication.





"Here's one of two Micromatic Model 523-2 machines used on the compressor crankcase job. Tecumseh uses a total of 18 Microhoning machines on other vital processing operations."

The principles and applications of Microhoning are thoroughly explained in an informative 16mm., 30-minute sound movie, "Progress in Precision." We'll be glad to reserve a print for your use. Just tell us on the coupon the date you'd like to see it.

☐ Please send me "Progress in Precision" in time for showing on _____ (date)

☐ Please send literature on Microhoning. I am interested in the following application: _____

NAME _____

TITLE _____

COMPANY _____

CITY _____ ZONE _____ STATE _____

MICROMATIC HONE CORP.

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

ROUND TABLE Discussion

JUST ONE BIG HAPPY FAMILY

Is the foremen's meeting a legitimate place to get across "team spirit" and enthusiasm? Or should it be a forum for discussion of departmental problems and their solutions? Do foremen need pep talks to keep them alive and awake?

LIKE Al, we all have had to suffer at one time or another the planned "booster" rallies, and the "pep" talks that urged us to go into the shop and spread sweetness and light, and the get-together spirit among the employees. We also had to listen to imported talent who were paid to fan the flame of enthusiasm and foster the growth of efficiency among us.

Frankly, I have seen very little evidence that it did much good. You cannot foster the team spirit by a planned shop get-together, or a pep talk, if the shop atmosphere has not been conditioned for it. No more than a football coach can infuse the winning spirit into a team who have more than a suspicion that the coach lacks sincerity and is only interested in the renewal of his contract or the prospect of a better job.

If the employees know that you are sincerely interested in them by the fact that you have done your best to provide good working conditions, fair and considerate treatment, and wages that are in line with your competitors, then I would say that the team spirit already exists. If you don't have the conditions I mention, then any attempt to graft on the team spirit by pep talks or

"I'll be at the unemployment bureau if you want me, chief."

that kind of stimuli is doomed to failure. Good labor-management relations have to start from the basic premise that the worker, besides being a unit of production, is a human being, interested in obtaining a decent living and entitled to safe, sanitary working conditions.

I have worked in shops where management spent large sums of money in attempting to create an atmosphere of goodwill, where the spirit of mutual distrust was so thick you could cut it with a knife. I have also worked in shops were the labor turnover was almost negligible, and there was a waiting list of job applicants. No need for pep talks or expensive hoopla to sell the worker on the idea that their particular plant was a good place to work—they already knew.

To my mind the formula is simple; good working conditions plus good wages, plus intelligent supervision. If you have these things, and make a sincere effort to retain them there will be no need for phony enthusiasm at the foremen's meeting. Rather, there will be more time—as Al says—for discussing the basic fundamentals of keeping the plant running in a smooth, efficient manner.

Robert S Alexander
Glastonbury, Conn

The foremen's meeting, properly conducted, is a good idea. Many worthwhile suggestions are adopted as a result of these meetings. They promote teamwork, and that so desirable pull-togetherness.

It would, however, get tiresome to hear the works manager continually tell us what a fine place it is to work in. It is good to point out the advantages of the company if it is not overdone. Actions speak louder than words in the manner of the leader toward the men under him. The works manager should know the men, like them, understand their problems, and be able to see things from their viewpoint. No one of us can expect respect, confidence, or loyalty unless we use some of these qualities in our dealings with others.

Some of the most important discussions at these meetings should be policy, personnel problems, production, quality, suggestions, safety, new ideas and methods. I know from experience that the foremen's meetings are the best way to see the whole objective. It gives each foreman the opportunity to understand the other fellow's viewpoint. His angle compared with our own often solves difficult problems.

When a company hires a salesman

Why TECUMSEH Compressor Crankcases Are MICROHONED

"On Tecumseh compressors, we Microhone the piston bores. ***This gives us a running seal between pistons and bores which prevents gas leakage and eliminates the need for piston rings!*** Believe me, it takes a real combination of accuracy and functional surface finish to get results like that . . . and only Microhoning has given us that combination!"

(Tecumseh Products Company, Tecumseh, Michigan, is the world's largest producer of refrigeration compressors. Precision engineered and processed these units are hermetically sealed before leaving the factory.)

OTHER JOB DATA:

MATERIAL	Cast iron
PRECEDING OPERATION	Diamond finish-bore
MICROHONING OPERATIONS	One
STOCK REMOVAL	.0007" to .001"
FINISH	10 Microinches
TOLERANCES	
Diametric	.0003"
Roundness	.00015"
Straightness (Taper)	.00015"
HONING CYCLE	18 seconds, including fixture indexing time

"Here's our twin cylinder crankcase. The two piston bores in each case are opposite one another in the vertical plane, but they lie in two different horizontal planes. We simultaneously Microhone both bores in each crankcase, using a horizontal type machine with two opposing spindles."

"Although all of our crankcases are similar in design, the bores vary in diameter—1.312", 1.375", 1.500" and 1.625". Two fixtures on a two-position rotary indexing table let us Microhone one crankcase while another is being loaded. To run different bore diameters we just change the tools and gage rings. Switchover time is about five minutes."

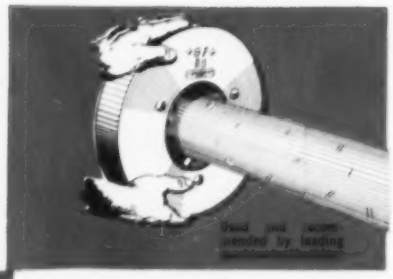
Let a Micromatic Field Engineer show you how Microhoning will give you better functional finishes, closer tolerances and higher production.

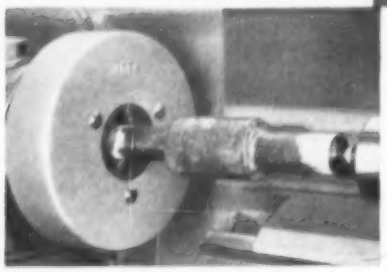
☐ *Please have a Micromatic Field Engineer contact us.*
☐ *Please send literature and case histories on Microhoning.*

NAME _____
TITLE _____
COMPANY _____
CITY _____ ZONE _____ STATE _____

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

SKINNER +GF+ WORK DRIVERS





the best for turning on centers

They're fast, powerful — the ideal means for driving smooth or rough bars and forgings located on centers! Jaws are easily reversed to accommodate direction of spindle rotation. Five sizes handle work from ¼" to 8 1/16" diameter.

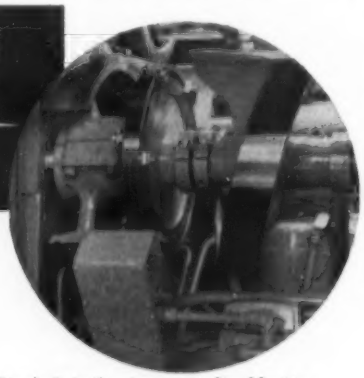
• ½ turn does the clamping — no wrenches needed • Each size has wide clamping range • Cuts clamping and unclamping time • Clamps out-of-round work evenly • Clamping force always matches cutting pressure.

Write Skinner or your Skinner distributor for folder.

THE CREST OF QUALITY

THE SKINNER CHUCK COMPANY
203 Edgewood Ave., New Britain, Conn.

SPLIT SECOND
COOLANT FLOW
with Ruthman GUSHER Coolant Pumps



Illustrated is a Cleveland Dialamatic Single Spindle Automatic Bar Machine equipped with a Gusher Coolant Pump.

Model 5-P 3

Your Gusher Coolant Pump is always primed and ready to deliver coolant instantaneously. There is no lag — no waiting for the flow to start — and you can easily regulate the volume from a trickle to full capacity.

Pre-lubricated ball-bearings, electronically balanced rotating shaft, and totally enclosed dustproof motor assure you also of long trouble-free life for your Gusher Coolant Pumps.

THE RUTHMAN MACHINERY CO.
1818 Reading Road Cincinnati, Ohio

he is told how the product is made, how it works, the number of parts, the selling price, and all of its outstanding qualities. He has to know the product he is selling because someone else is going to ask him these questions.

That is what I mean by the whole objective. Know the product, the company policy, and the other fellow's department in relation to your own. How can we become interested in the other fellow's problems if we never get a chance to talk to him? The opportunity to sit down and talk freely evaluates things, enabling us to make use of that which is worth keeping.

A E Salmons
Norristown, Penna

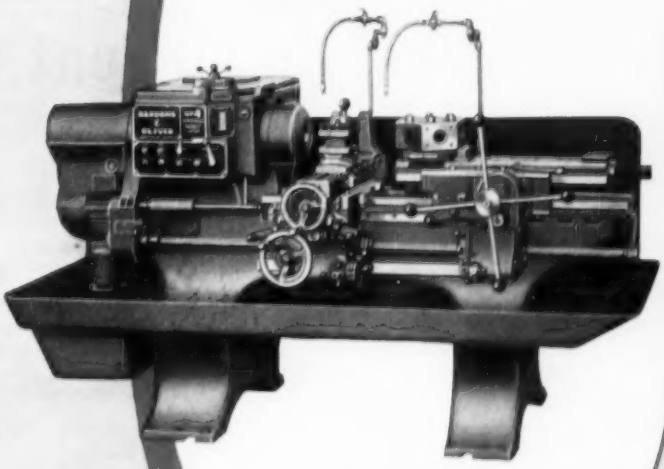
The foremen at some other companies feel just the way that Al does about this business of foremen's meetings. This unsatisfactory feeling is liable to be developed at most any plant unless the management is very careful about how the meetings are handled. The idea of getting all the foremen together once a week for general instructions and policy decisions strongly appeals to some managers. The general idea is that everything can be settled at one time and at one meeting, also there can be no misunderstanding since every foreman hears everything that is said and what is finally agreed upon. This idea, at the first glance, may seem good—and it can be good—but it also can be a cause of a slow and complete collapse of the efficiency and good will that was hoped for, and finally leave the company with a bunch of dissatisfied, uninterested foremen.

The time to call these meetings is quite a problem; early morning is unsatisfactory because at that time

"He hasn't got all his 'Buttons'!"

HARDENED & GROUND

Alloy Steel Bed Ways . . . can mean the difference between normal turret lathe life and very rapid deterioration



• To insure the long life accuracy of Bardons & Oliver Turret Lathes, bed ways are of hardened and ground alloy steel and are replaceable. Final superfinishing provides frictionless carriage travel. Closely spaced alloy steel studs hold the bed ways rigidly to the bed. The front bed way extends beneath the headstock to provide longer bearing for, and increased rigidity of, the cross slide carriage.

The integrally cast headstock and bed assures permanent alignment of spindle and bed ways. Diagonal "V" ribbing between the bed walls extends for the entire length of bed and beneath the headstock.

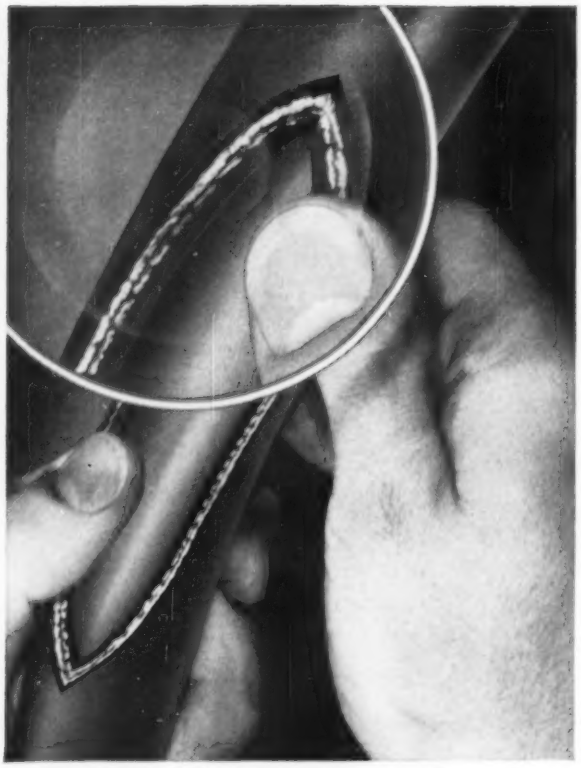
The superior design combination of headstock, bed and bed ways is only one of the features we are proud to offer. For complete information on the advantages of Bardons & Oliver Turret Lathes, write us on your company letterhead.

Manufacturers of a complete line of Turret Lathes and Cutting-Off Lathes.

BARDONS & OLIVER, INC.

1134 WEST 9TH STREET • CLEVELAND 13, OHIO

Ordinary hose, with rubber-composition liner, soon deteriorates from active solvents present in all paint materials.



DeVilbiss synthetic-compound liner lasts indefinitely, because it is specially formulated to withstand all solvents.

DeVilbiss-made paint hose resists solvent action longer

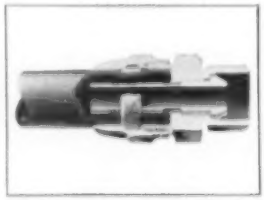
"Torture" tests, the most conclusive known for solvent-hose analysis, prove the superiority of DeVilbiss hose.

Fluid liners from DeVilbiss and other brands of paint hose, when exposed to the prolonged solvent action of common paint thinners, tell the story. The DeVilbiss liner shows no sign of deterioration, while others show marked changes from the effects of turpentine, acetones, ketones, acetates, toluol and other hydro-carbons – proof that DeVilbiss hose outlasts other makes in operations where paints are conveyed.

This laboratory evidence is your assurance of longer protection against hose-liner disintegration, swelling, and plugging – against paint contamination and discoloration!

Next time you order, specify DeVilbiss-made hose. Not only does it resist solvent action better, but also it is manufactured to closer dimensional tolerances . . . and is produced in a specialized DeVilbiss Rubber Plant, where the requirements of quality hose for spray painting have been a scientific study for over 40 years.

DeVilbiss' new oil-resistant air hose is specially compounded for long-lasting service with air tools that require lubrication through the air stream.



DeVilbiss hose connections fit all common sizes of all types of air and fluid hose; provide a smooth, tight-grip, leakproof connection; are reusable.

THE DEVILBISS COMPANY

Toledo, Ohio

Santa Clara, Calif. • Barrie, Ontario • London, England

Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY

DEVILBISS

the foremen are very busy starting the day's production. Half hour before noon is objectionable because if the discussion of some important method or change in operations becomes involved then the discussion is apt to pass into the noon hour and most of the foremen will feel disgruntled all afternoon because of having to have either a cold dinner or a late lunch. The middle of the afternoon is not too good either because the men quickly discover that all the foremen are tied up, so visiting and horseplay is apt to take over and cause dips in the production curve which, in turn, causes worry in the cost-keeping department.

One aggressive manager thought he had a real smart solution by setting the time of the foremen's meeting at 4:45 pm, or fifteen minutes before quitting time, and then he would give a pep talk that generally lasted close to 6 o'clock to the utter disgust and unhappiness of the foremen who mentally saw their evening meal slowly being spoiled, and their family all upset, to say nothing about the riders in the foremen's cars waiting for their transportation. The only ones who gained anything by this scheme were the shop men who took ample time to get all washed and ready to leave, and were waiting near the gates ready to dash for their cars the instant the quitting whistle sounded.

Some years ago the management of a certain well-known factory decided to give the men Saturdays off. This worried the manager no end, for he felt sure this extra time would be used by the men in getting drunk and carousing around in saloons east of the railroad tracks, and that they would arrive to work on Monday morning all played out and bleary-eyed, thus causing a dip in the production curve and a riot at the director's meetings. To counteract this, the manager immediately started planning picnics, outings, trips and elaborate mass games; the idea being that entertainment must be provided for every Saturday afternoon to give the men something to do and thus keep them out of trouble. The foremen hated all this extra work and the fact that every one of them was expected to spend his Saturday afternoon supervising his gang at the picnic and later helping the clean-up and the trucking back of benches, table tops, kitchen equipment etc. The men, in turn, simply looked upon the whole business as a nice free feed for themselves and their families, and took the attitude that if the company wanted to provide a free meal they would gather around and eat it. The management finally decided the scheme was just an unnecessary expense and replaced the manager with a man who was more interested in production costs than where the men spent their Saturday afternoons.

The most satisfactory arrangement I know of is the one calling all foremen to a meeting in a room adjacent to the cafeteria where a good dinner is served to everyone with the compliments of the company. Here the manager not only discusses pertinent matters, but always has arranged for a specialist to give a pleasant talk on some new method of production or labor-sav-

THE OLDER I GET, THE DUMBER I GET ... IT SAYS "MATERIAL - S/1440C - OR EQUIVALENT" WHAT THE HECK DOES THAT MEAN?
ME TOO! ONE PIECE HERE IS TO BE MADE OUT OF "HYTEMP" AND ANOTHER OUT OF "T-21 FULPRUF". WHAT EVER HAPPENED TO IRON AND STEEL??
EVERY TIME A NEW MATERIAL COMES OUT, IT PUTS US OLD TIMERS ONE STEP BACK. THEN WE HAVE TO GET THE SCOOP FROM SOME YOUNG TIMER OUT OF A TRADE SCHOOL AND THAT MAKES IT WORSE!
N. JARVIS

LOOK TO DEVILBISS

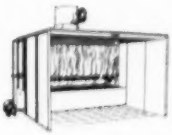
for all your spray equipment needs!

DeVilbiss offers the industry's most complete line of spray equipment – spray guns, spray booths, air compressors, hose and connections – for cold or hot-spray applications . . . manual, semi-automatic, or fully automatic operations.

At your service are a free training school for your operators and supervisors, and a complete research laboratory to analyze your particular coating problems. Call our nearest representative now!

DeVilbiss spray guns are lightweight, comfortably balanced. High-speed, large-capacity types, or small precision models.

DeVilbiss air compressors deliver up to 22.6% more air per dollar than most others. Stationary and portable models. ¼ thru 15 h.p.



DeVilbiss spray booths come in a complete range of types, sizes. Standard, fireproof, reinforced steel panels.

THE DEVILBISS COMPANY
Toledo 1, Ohio

Santa Clara, Calif. • Barrie, Ontario
London, England

Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY
DEVILBISS

Facilities of...
COMMERCIAL HEAT TREATERS
can cut YOUR costs

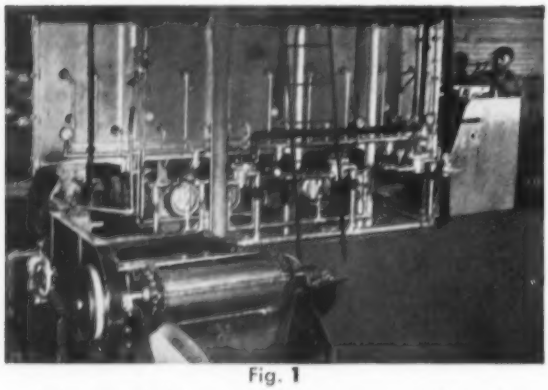


Fig. 1

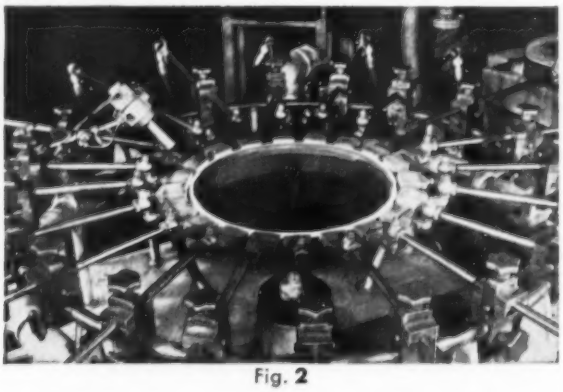


Fig. 2

An MTI commercial heat treater is located near you and is ready to serve your needs by performing "Custom-tailored" heat treating operations.

Because all members of the MTI are specialists with complete service facilities centralized in one plant, they are equipped to offer you a variety of heat treating processes—atmosphere hardening, carburizing, nitriding, annealing, cyaniding, etc.

For example, Fig. 1 shows an installation of a shaker hearth furnace with a continuous automatic quenching tank and a conveyor to a washing machine.

Fig. 2 illustrates a gas flame hardening unit featuring accurate temperature control and using two semi-circular gas manifolds mounted on movable carriages with 20 or more burner heads.

A further example of versatile and dependable equipment found in a commercial heat treating plant is seen in Fig. 3. The specially designed furnace conveyor belt carries over 35 lbs. per sq. ft. in normal service and sometimes as much as 5000 lbs. are loaded on it with pieces ranging from ½ lb. to 100 lbs. and temperatures up to 1650°.

Possessing such equipment together with many other specialized facilities and employing the trained personnel with technical knowledge and experience is the business of the commercial heat treater. Teamwork between you and the commercial heat treater can cut *your* costs.

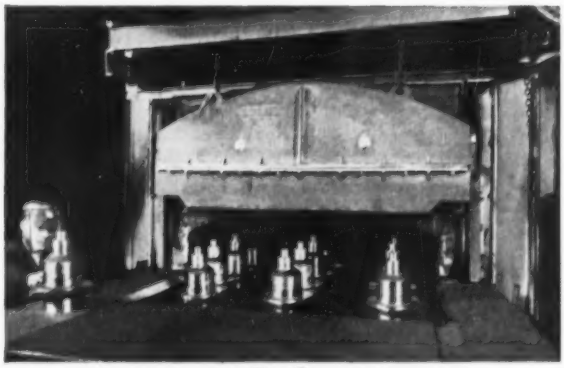


Fig. 3

WRITE FOR *the booklet called:*

"STRATEGIC USE of OUTSIDE HEAT TREATING FACILITIES CAN CUT COSTS."

***Consult any of these* HEAT TREATING SPECIALISTS**

Allied Metal Treating Corporation
Kenosha, Manitowoc, Port Washington, Racine, Wisc.

American Metal Treatment Co.
Elizabeth, New Jersey

Anderson Steel Treating Co.
Detroit, Michigan

B. & W. Precision Heat Treating Co.
Kitchener, Ontario, Canada

Benedict-Miller, Inc.
Lyndhurst, New Jersey

Bennett Heat Treating Co., Inc.
Newark 3, New Jersey

Commercial Metal Treating, Inc.
Bridgeport, Conn.

Cook Heat Treating Co. of Texas
Houston 11, Texas

The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio

Dominy Heat Treating Corp.
Dallas, Texas

Drever Company
Philadelphia 33, Pennsylvania

MTI
METAL TREATING INSTITUTE

Greenman Steel Treating Company
Worcester 5, Massachusetts

Fred Heinzelman & Sons
New York 12, New York

Alfred Heller Heat Treating Co.
New York 38, New York

Hollywood Heat Treating Co.
Los Angeles 38, California

H-R Heat Treating Company
Newark, New Jersey

The Lakeside Steel Improvement Co.
Cleveland 14, Ohio

Metallurgical, Inc.
Minneapolis 14, Minnesota

Metallurgical, Inc.
Kansas City 8, Missouri

Metlab Company
Philadelphia 18, Pennsylvania

New England Metallurgical Corp.
South Boston 27, Massachusetts

Paulo Products Company
St. Louis 10, Missouri

Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania

The Queen City Steel Treating Co.
Cincinnati 25, Ohio

J. W. Rex Company
Lansdale, Pennsylvania

Stanley P. Rockwell Company
Hartford 12, Connecticut

C. U. Scott & Son, Inc
(Stainless Steels)
Rock Island, Illinois

Standard Steel Treating Co.
Detroit 10, Michigan

Syracuse Heat Treating Corp.
Syracuse, New York

Winton Heat Treating Company
Cleveland 16, Ohio

This advertisement sponsored by these Companies which are members of the Metal Treating Institute

ing plan. These are generally illustrated by a small moving picture projector or by work samples. These talks are quite interesting, as well as educational, and everyone leaves the meeting feeling that he has learned something useful in addition to having a nice lunch.

George P Pearce
Albuquerque, NM

THE QUESTION is asked whether some companies overdo the "team" idea to the point where this approach turns against company management. It must be emphasized that properly putting across the team idea depends on the skill and ability of the leader of the group as management's spokesman. Cooperation, loyalty, teamwork, and the "just one big happy family" idea can be successfully encouraged and properly stimulated in a group of men provided the sparkplug is there: a capable, tactful, and understanding leader of men. On the other hand, the inept and supercilious executive will surely extinguish any semblance of teamwork in the group he supervises. Flaunting of superiority evidenced in the boss's attitude cannot help but breed some degree of dislike and distrust. The inept leader can certainly turn the glimmering of real teamwork into dull apathy and bring on charges of creeping company paternalism.

An excellent example and demonstration of the effects of positive and negative leadership is at the foremen's monthly meetings. Here the good executive has opportunity to display what it takes to be a good boss, to represent management effectively, and encourage teamwork. Through his ability to understand people and their motivation he is

"Don't let that scare you . . He's the easiest guy in the world to get along with . . as long as he gets his own way . . !"

REAMERS

TAPS

KNURLS

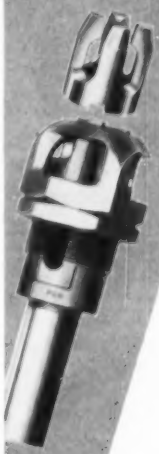
THREAD ROLLING DIES

CUT-OFF BLADES

Screw Machine Cutting Tools

for the long run . . .
because they run longer!

MONOCONE DIES AND HOLDERS



DUOCONE DIES AND HOLDERS

Next time you buy Screw Machine Cutting Tools, remember it's not the purchase price but what you get for your money that counts most . . . how many pieces each tool delivers on the production line!

In correct design and high quality, P&W Screw Machine Cutting Tools rate as the best buy anywhere. And you can select the tools you need — when you need them — from comprehensive warehouse stocks carried *on the shelves* at the Pratt & Whitney Branch Office conveniently near you.

FOR COMPLETE INFORMATION, WRITE TODAY FOR FREE CUTTING TOOL LITERATURE.

PRATT & WHITNEY COMPANY
INCORPORATED

11 Charter Oak Boulevard, West Hartford 1, Connecticut
Branch Offices and Stocks in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

ALL ENDS OF PARTS

Completely Finished

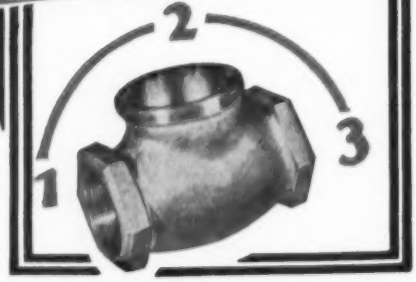
"1·2·3"

ON THE

GOSS *and* DeLEEUW

Automatic Chucking Machine

in 1 SET-UP

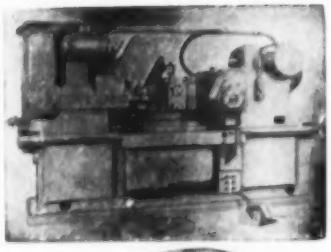


This recent Goss & DeLeeuw development has already received universal acclaim as an outstanding achievement.

In speed, ease of tooling and precision finishing, the "1-2-3" chucker provides engineering advantages which result in vastly greater production at a fraction of parts' costs by other methods.

Easy, fast change-over from job to job makes this machine ideal for short-run requirements. Sturdy construction, power and speed make its advantages also apparent on long runs.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence — a method exclusive with Goss & DeLeeuw and offered on this machine.



Illustrated literature available promptly on request. Send samples of your work for time and cost estimates.

GOSS & DeLEEUW — QUALITY PRODUCT-QUANTITY

GOSS *and* DE LEEUW

MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

able to guide their effort and action along desired and beneficial channels. Through him every member of the team is enabled to understand definitely and fully what the company expects of him and what the company is doing for his welfare. Foremen's meetings offer a good forum for reducing complicated subjects, proposals, or discussions to their simplest terms. At these meetings the chairman or leader can demonstrate his faculty and facility for grasping and holding up to clear sight the real issues, no matter in what amount of verbiage they have been buried. Here is the opportunity to sell the men on the advantages of working for the company energetically and enthusiastically. Here is where tough personnel problems should be tackled and resolved. For a certainty, the enthusiasm and teamwork generated at a well-organized and conducted foremen's meeting will be carried over by the foremen to their men.

The use of regular foremen's meetings for solving ordinary problems is a common practice in industry today. There may be times when the meetings may not measure up to the expectations of all foremen present. But aberration and ineptness of the chairman should be ignored, and criticism held in abeyance.

Foremen's meetings held at regular intervals provide excellent means for intramanagement communications. They supplement training, provide company information, and strengthen management unity. Obviously, foremen as management representatives cannot communicate effectively with employees unless they themselves are adequately informed. Top management often fails to recognize this simple fact. Meetings furnish means of personal communication with the group and

(Continued on page 176)

"Gus, I need a good set-up man at the shop."

Tool Steel Topics

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

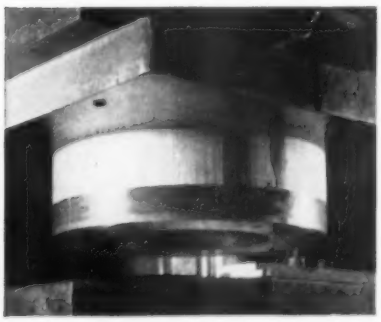
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

Good Results with BTR Hollow-Bar in Manufacture of Fan Housing

Based upon all-around performance — less time spent in machining, good resistance to wear, and ease of heat-treatment — dies of BTR (Bethlehem Tool Room) Hollow-Bar rang the bell recently at Electrolux Corp., Old Greenwich, Conn.; the steel was supplied by Lindquist Steels, Inc., Bridgeport, Conn.

The dies, hardened to approximately Rockwell C 60, and operating in a 100-ton press, formed fan housings from 25-gage zinc-coated sheet steel at the rate of more than 1600 pieces per hour. Redressing was required once every two months or so, and then no more than 0.010 in. was removed.



BTR Hollow-Bar is made from our oil-hardening tool steel by a process called high-speed trepanning. By this method, we take hammer-forged round bars, core the inside diameter, then give them a rough-turning on the outside.

With BTR Hollow-Bar there's no need to run up shop costs waiting for delivery of forged rings or discs. Instead, this fine tool steel comes to you ready to go, with no need for drilling, rough-boring, rough-facing or rough-turning.

Your Bethlehem tool-steel distributor will be glad to explain how BTR Hollow-Bar can be of real service to you. Or a phone call or letter to the nearest Bethlehem sales office will bring you detailed information promptly.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Remove all the "Bark" from Liquid-Quenched Tools

Most users of tool steel realize that it is necessary to remove the "bark" (scaled and decarburized outer surface) from tool-steel bars in order to obtain full, uniform hardness in heat-treatment. If this area is not removed, low hardness will result because of the low carbon content of the decarburized metal. It is not always recognized that this procedure is necessary on tools which are to be liquid quenched, even though portions of the tool do not constitute working surfaces.

If tools are to be liquid quenched, all the bark must be removed to avoid excessively high quenching stresses which could cause cracking of tools during hardening. Low carbon areas on the surface transform during hardening at a different time than the higher carbon interior. This sets up additional stress which, added to the high thermal stresses from quenching, could cause cracking. Air-hardened tools can tolerate bark on non-working areas because of the low hardening stresses in air hardening. But with liquid-quenched tools there are no exceptions — remove all the bark.

TOOL STEEL MOVIE WINS ANOTHER AWARD

"Teamwork," Bethlehem's new motion picture on tool steel, received a second film award, a silver reel symbolic of excellence, at the recent American Film Assembly competition in Chicago.

The 16-mm, 30-minute color film explains the manufacture, quality control and heat-treatment of Bethlehem tool steels. It is available for showings to machinists, heat-treaters, die makers and tool manufacturers. To see the film, write to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

ANNOU

greatly expanded

Air Express service

*RADIO-EQUIPPED TRUCKS

†TELETYPE NETWORK

More speed!
Constant shipment control!
No extra cost!

NCING:

✻ In one metropolitan center alone, Air Express has reduced average pick-up and delivery time by more than half! (And it was notably efficient to start with!)

Amazingly – by introduction of new equipment and new methods – Air Express is chalking up new records for cutting "ground time" of shipments.

Radio-equipped trucks in leading markets are now in constant touch with Air Express Dispatchers. Pick-up time is cut to a minimum. Deliveries are expedited.

All this speed-up of service with Air Express is now yours – with no added charges!

† Air Express now can practically pinpoint shipments. A key-city network is linked together by private teletype service, tied in with scores of other communities in a nationwide network.

All along the route, teletype carries the vital information of all load messages – weight, number of pieces, destination, plus special information or instructions.

Thus, the greatest possible control of Air Express shipments – at no increase in cost to you!

In fact, thousands of users regularly find "Air Express costs less" than any other service!

Two-way Radio of the most modern design connects this Air Express truck with central Dispatcher – cuts "ground time" for shipments more than half–yet, costs you no more!

New Teletype Service enables you, the shipper, or your consignee, to "keep an eye" on Air Express shipments – trace them en route – meet them on time – and at no extra cost!

For the world's most efficient, most complete air shipping service–linking some 23,000 U. S. communities, all by one through carrier–call

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*

CALL AIR EXPRESS . . . *division of* RAILWAY EXPRESS AGENCY

BARNESDRIL

Magnetic
COOLANT
SEPARATORS

give you these features for

Practical
COOLANT
CLEANING

✻ AUTOMATIC — The Separator requires no attention other than periodic emptying of the sludge pan.

INTENSE MAGNETIC POWER — coolant flow is restricted to intense magnetic field so that more ferrous material, entrained abrasives and other foreign matter is removed per minute per gallon than by any other method.

DOUBLE CLEANING ACTION — magnetized particles form a fan-shaped pattern on the surface of the magnetic drum which serves to "comb out" free abrasive or other materials as the drum rotates.

RAPID SEPARATION — coolant is processed rapidly, flowing by gravity through the separator, for effective circulation at all times. No additional coolant supply necessary to compensate for the cleaning operation.

See your Barnesdril representative or write for Catalog 3004.

Barnesdril Automatic Coolant Separators remove swarf, sludge and abrasive particles automatically from soluble and oil coolants. Built in ten sizes — 1½, 3, 5, 10, 20, 30, 70, 100, 280 and 350 gallons per minute capacity.

BARNESDRIL COOLANT CLEANING

BARNES DRILL CO.
830 CHESTNUT STREET • ROCKFORD, ILLINOIS

mutual interchange of information. Nothing can take the place of direct man-to-man relationship between foreman and his supervisor. But this should be supplemented by monthly group meetings. As the company increases in size there is greater necessity that channels of information are established for communicating management's ideas speedily to its representatives, the foremen, and on down the line.

A novel twist to the foremen's meeting has been imparted by one plant. Foremen at this plant seldom have to call on higher management to settle routine problems and differences that arise in carrying out company policies. Instead, they solve the problems themselves at their weekly meetings. Only foremen are present at these meetings —no personnel or training men, no top brass. Nobody tells the group whom to invite or what to talk about. The chairman is elected from their own ranks, and only the foremen have keys to their meeting room. At their meetings, the foremen review their problems in applying company policies on the plant floor and discuss the information they received the day before in their meetings with their superintendents. They review all new policies before they are put into effect. And when a foreman bumps into a serious problem or takes disciplinary action against one of his workers, he brings up the case to share his experience with the group. Only if they can't agree is the superintendent or some other qualified person called in for clarification. One out of every three weekly meetings is devoted to personal problems and company policies. At the other two meetings, experts from inside or outside the plant discuss special topics. And every so often the group schedules a refresher course on a subject of current interest.

Foremen's meetings, held at regular intervals, preferably monthly, are a good way of insuring "just one big happy family." But to assure success for the meetings, the leader should remember that "discretion in speech is more than eloquence."

Harry Kaufman
Philadelphia, Penna

I CERTAINLY think some companies do overrate the team idea and I am all for Al and his robust commonsense in this matter. The team spirit, especially in large concerns, is vitally important, but juvenile pep talks from top flight executives are more likely to cause resentment

It's the Coolest...

and PRODUCTION METHODS at York are real cool too, man!

No matter how you say it, the facts are easy to understand—York assembles the entire chassis and wrapper for three different size air conditioner units with unusual efficiency and at minimum cost. And they do it all with Sciaky resistance welding techniques—developed to put profits back into manufacturing!

That enviable combination of good design and low cost is giving York's cool comfort to more summer-bound families than ever before. Not even the toughest assembling operations can disturb your sleep this summer if you take advantage of Sciaky resistance welding techniques—just like York does!

SCIAKY

Largest Manufacturers of Resistance Welding Machines in the World

Turn the page and see how York's doing it.....

The Sciaky technique of resistance welding used by the York Corporation, York, Pennsylvania.

Complex air conditioner chassis assembly costs cut 34.5% . . . Multi-part wrapper assembly costs cut 60.9%

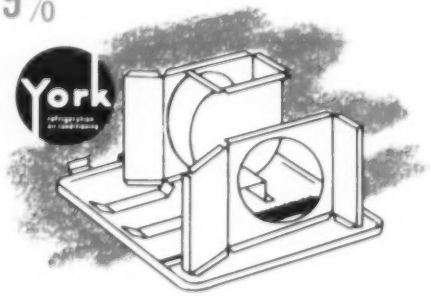
Sciaky Resistance Welding Techniques simplify operations, increase production, and facilitate model change-over at York Corporation

Integrated, standard Sciaky welders and a simple multiple gun welder assemble the entire chassis and wrapper for the one-half, three-quarter, and one ton size York air conditioners.

This Sciaky technique of fabrication, producing 90 assemblies per hour, permits tremendous production increase *without* basic equipment change. And seasonal model change-over is readily accomplished.

Put the Sciaky concept of resistance welding to work on your product . . . your result—*more useful work* at *lowest operating cost* with *maximum reliability!*

Write for your free copy of "Resistance Welding At Work", Vol. 4 - #10 for all the details of the development and use of the Sciaky technique of assembly at York.



Sketch of completely assembled York Air Conditioner Chassis.

• • •

Write for Bulletins 338 and 339

The most significant development in the history of resistance welding . . . the new Sciaky Predetermined Electronic Counter Weld Control.

Largest Manufacturers of Resistance Welding Machines in the World

SCIAKY

Sciaky Bros., Inc., 4916 West 67th Street, Chicago 38, Illinois, POrtsmouth 7-5600

such as Al expresses. Actions always speak louder than words and higher management can do much more for the team spirit by participating in it than by merely talking about it.

Absence of leadership makes nonsense of anything they may say at the pep talks. That, to my mind, is the root cause of some of the present-day industrial discontents. I am all in favor of foremen's meetings; intelligently handled, they can be productive of gratifying results. Too many companies pay lip service to the idea without reference to the quality of the lecturer or the composition of the audience.

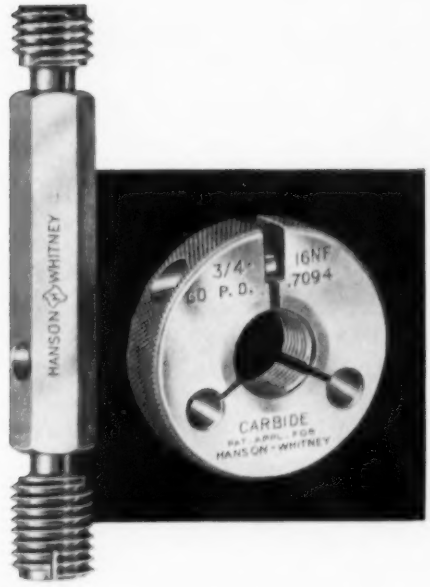
Sitting in at about a dozen talks to foremen convinced me that Al is talking sound commonsense when he suggests that Harrison should turn his attention to getting across a few good basic ideas if he insists on appearing in a talking capacity at such gatherings.

Of basic ideas, their name is legion. Shops and stores organization in themselves would provide material for a complete course. It should be remembered that overall planning by a special staff does not absolve the shop foreman from what may be called the domestic planning of his section. That is, planning arising out of unforeseen day-to-day happenings in the shops, not foreseen, and unforeseeable by a dedicated planning section.

If, for example, the tutors could address themselves to the matter of resourcefulness and adaptability, if they could give the foremen a line on how to handle an emergency, how, by resourceful thinking and rapid decision, to nullify, say, the bottleneck effects of a breakdown; how, with a minimum of lost man/machine time, to make a rapid switch of a temporary nature to keep the wheels turning till the original trouble had been sorted out, they would improve their status in the eyes of the foremen and make a valuable contribution to industry in general.

From a varied industrial experience, from conversation and discussion with other companies, interested executives and from press articles, I am convinced, like Al, that some managements do flog the team idea. One can get too much of a good thing and, anyway, most good things sell themselves. Good working conditions and good pay are self evident; they don't need boosting, and a foreman's meeting is the wrong platform.

C Donald
Lanarkshire, Scotland



NOW . . . CARBIDE GAGES
QUALITY AND SERVICE
IN THE H-W TRADITION

The integrity of your product is assured by use of Hanson-Whitney machine tools, cutting tools, and precision gages for screw threads . . . engineered and manufactured with **single source** reliability and precision. Hanson-Whitney alone offers **single source** product integrity, your guarantee of production perfection.

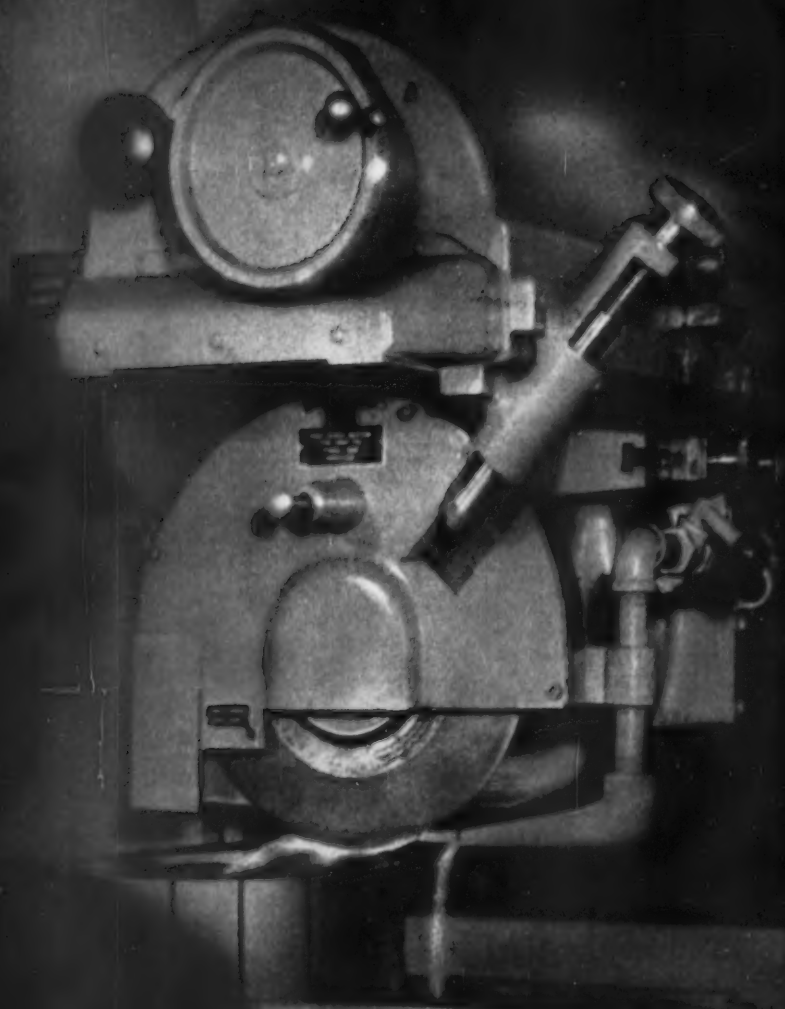
Write for further information and literature

H-W Thread Comparators. For fast, accurate visual checking.

Hanson-Whitney
COMPANY
DIVISION OF THE WHITNEY CHAIN COMPANY
170 BARTHOLOMEW AVENUE • HARTFORD 2, CONN.
TAPS • THREAD GAGES • HOBS • CENTERING MACHINES • THREAD MILLING MACHINES AND CUTTERS

WORLD'S MOST COMPLETE LINE

# of hydraulic surface grinders



invites your attention...

name the surface grinding job... Thompson has the machine

Thompson Type B

Surface dies or parts faster to part print, at lower cost, within wide size range

work size

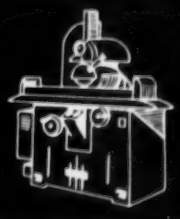
6" x 18" to 12" x 120"

Thompson Type F

For greatest precision, sensitivity and versatility in toolroom... or parts production at low cost

work size

6" x 18" and 8" x 24"



Thompson Type C

Meets production and cost demands in larger size surface work of all types

work size

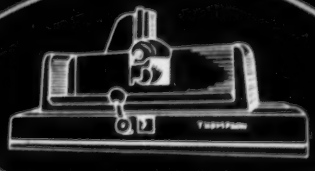
12" x 40" to 24" x 168"

Thompson Type CX

Offers both power and precision for heavy duty production... fast, accurate

work size

30" x 72" to 36" x 240"



Thompson SURFACE Grinders

Including a complete line of Truform, Hydrail, Twin Rotary and other special grinders for all sizes and types of work.

write for descriptive data

THE THOMPSON GRINDER COMPANY

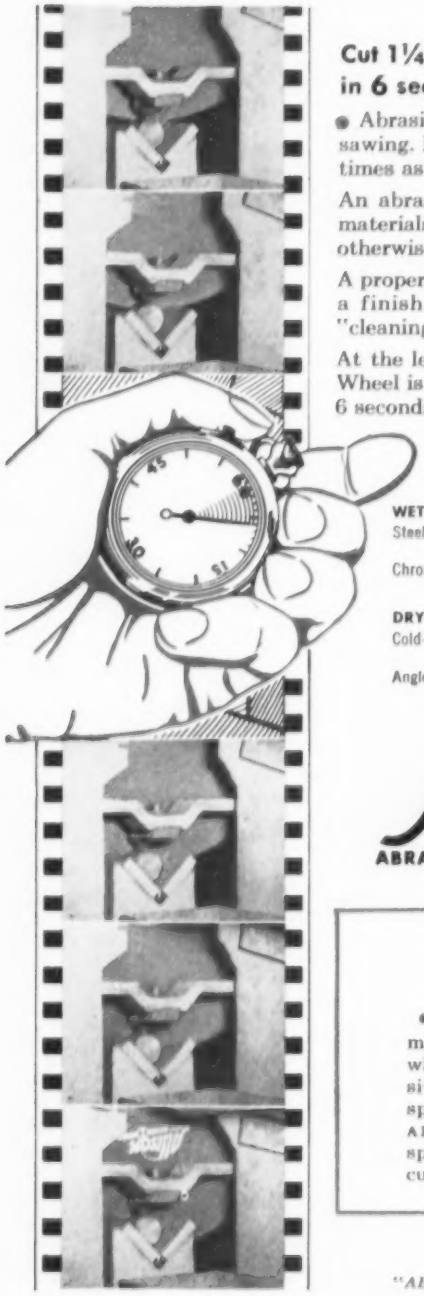
SPRINGFIELD, OHIO

Copyright 1956 The Thompson Grinder Company

Abrasive Cutting

the best way to cut many materials
the only way to cut some

Allison Cut-Off Wheels



Cut 1¼" Bar Stock in 6 seconds

● Abrasive wheel cutting is faster than sawing. In many cases it is ten to twenty times as fast.

An abrasive wheel will cut the hardest materials with ease. No need to anneal or otherwise prepare material for cutting.

A properly selected abrasive wheel leaves a finish which requires little, if any, "cleaning-up" operation.

At the left an ALLISON Abrasive Cutting Wheel is shown cutting 1¼" bar stock in 6 seconds per cut.

HOW'S THIS FOR PERFORMANCE?

	Cutting Time
WET CUTTING	
Steel Bar.....8" dia.. Rotary-type machine....	320 seconds
Chrome Steel Bar.....4" dia... Oscillating-type machine..	105 seconds
DRY CUTTING	
Cold-rolled Steel Bar..1" dia... Chop Stroke-type machine..	2 seconds
Angle Iron.....1" x 1" x ⅛".. Chop Stroke-type machine..	2 seconds

Allison
ABRASIVE CUTTING WHEELS

It pays to consult a specialist

● Profitable abrasive cutting means using the right abrasive wheel...and the proper abrasive cut-off machine...for the specific job. Why not let an ALLISON abrasive cutting specialist check your hardest cutting job?

Send for Booklet "ABRASIVE CUTTING" today

ACCO
TRADE MARK

ALLISON DIVISION
AMERICAN CHAIN & CABLE

254-A Island Brook Avenue, Bridgeport 8, Conn.

New Books . . .

PROCEEDINGS OF THE NATIONAL ELECTRONICS CONFERENCE; VOLUME 11—*Published by National Electronics Conference, Inc, 84 E Randolph St, Chicago 1. 1040 pages. Price $5.00.*

This book covers the conference of October 3, 4, 5 '55, held in Chicago, and includes practically all the papers presented there, in total. There is also material on official personnel and a program; and indexes for the earlier 10 volumes, covering ten earlier conferences, are included with the current index.

For the price it includes a whale of a lot of electronics information, although not all of it useful in Metalworking. But there is considerable data of use in industry, covering such subjects as:

Magnetic amplifiers
Instruments and measurements
Computers
Circuit analysis
Ultrasonic devices
Ferromagnetic devices
Servomechanisms and control
Electronic reliability

Primarily, the book could serve as a guide to control engineers and others concerned with automatic equipment related to machines. Most of the papers include diagrams and photos, and material is fairly complete within the aims of the authors. Mainly, the papers present results of research and experimentation; much of it with practical values.

LUBRICATION OF INDUSTRIAL AND MARINE MACHINERY—*By William G Forbes. Revised by C L Pope and W T Everitt. Second edition. Published by John Wiley & Sons, Inc, 440 4th Ave, New York 16. 351 pages, 6 x 9 in. Price, $7.*

The content of this book is a little surprising, because the title would lead a reader to expect a text composed mainly of practical working information on lubrication. What he finds, though, is that almost all of the first half of the book is a rather detailed study of refining of petroleum products, physical and chemical properties of hydrocarbons, lubricant tests and their meanings, and the theory of bearing lubrication. If this kind of background information

(Continued on page 184)

NEW

No. 3-36 . . . 36" table travel . . . 64" x 16" table . . . full automatic hydraulic feed.

No. 3-36

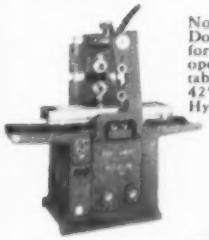
HYDRAULIC MILLING MACHINE

Now—the family of Kent-Owens Milling Machines has expanded to give you the same unexcelled milling accuracy, speed and dependability for *larger size work!*

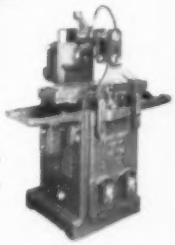
Proudly we present the No. 3-36 Hydraulic Milling Machine . . . the new "big brother" in the line of popular Kent-Owens Millers. Each Kent-Owens machine is ruggedly designed with advanced features throughout for greater dependability and accuracy to maintain tough production schedules. Write for bulletin 955 on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines.

Kent-Owens Machine Co., Toledo, O.

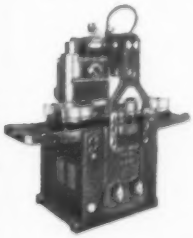
Simple . . . Rugged . . . Efficient



No. 2-20DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42" x 12" table. Hydraulic feed.



No. 1-14 . . . 14" table travel . . . 32" x 9" table . . . hydraulic table feed . . . full automatic cycle.



No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

No. 1-M . . . Hand feed to table and head . . . 25" x 9" table . . . 12" table travel . . . head counter-balance is adjustable.

Call on

KENT-OWENS

for MILLING MACHINES

KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.

BUFFALO
Bradley-Hoffmann Mach'y Co.

CHICAGO
Irwin Bowen Machy Company

DALLAS
Hosner Machine Tool Co.

DAYTON
C. H. Gardner Machy Co.

DETROIT
A. C. Hollenbeck Machy Co.

FT. WAYNE
Ghelo Machinery Co.

GRAND RAPIDS
Dowell Machinery

HAMILTON, OHIO
F. E. Reiter Machy Company

HARTFORD
Huntington Machinery, Inc.

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Ghelo Machinery Co.

KANSAS CITY
Hoffmann Machinery Co.

LOS ANGELES
Hallidie Machinery Co.

MILWAUKEE
Irwin Bowen Machy Company

MINNEAPOLIS
The Gardner Company

MOLINE
John F. Nevenstein Co.

MONTREAL
F. F. Reiter Machy Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Huntington & Irwin Bowen Corporation

PHILADELPHIA
Ghelo Machinery Company

PITTSBURGH
Hosner Machinery Company

ROCHESTER
F. W. Schaller Machinery Co.

SAN FRANCISCO
C. F. Elmes Machinery Co.

ST. LOUIS
Wm. Ahrens Company

SYRACUSE
F. F. Owens Machy Company

TORONTO, ONT.
F. F. Reiter Machy Company

WINDSOR, ONT.
F. F. Reiter Machy Company

Will it fly?

It certainly will! In fact you can find many just like it "flying" through quick-ripening tobacco crops. It's the Case "88," America's newest tobacco harvester. And 100% of the welds are made with A. O. Smith electrodes.

Anniston, Ala. — When this new harvester went into production, J. I. Case Co. production officials knew a major share of costs would be for welding. Therefore, to make sure they were using the best possible procedures, they called on A. O. Smith.

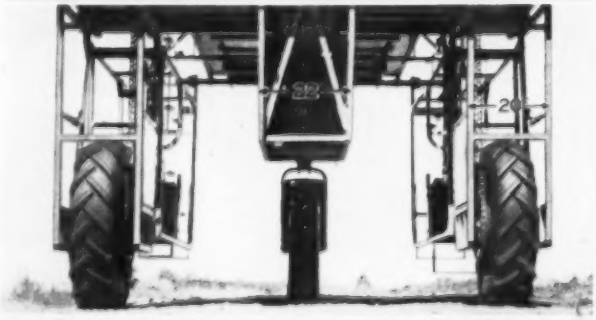
In response, a topflight specialist from A. O. Smith visited their Anniston plant, spent a week surveying their welding procedures.

Result: Welding operations at this plant are running smoothly . . . costs are satisfactory . . . and A. O. Smith SW-14 and SW-65 electrodes are being used for 100% of the welds.

This is one of many examples of A. O. Smith's ability and willingness to help you solve your welding problems — big or small. Why not get in touch with your "man from A. O. Smith" today for all the details.

The man from A. O. Smith
Owen Ford is the A. O. Smith representative who worked with J. I. Case at Anniston. More than a salesman, he's a welding specialist, ready and eager to help you with any of your welding problems.

Here's the Case "88" at work. Terrain it must travel is uneven . . . submits frame to severe torsional stresses and strains. Thus welds must be of unusual strength.



This view of the Case tobacco harvester's undercarriage clearly indicates why "small area" welds will have to carry heavy loads without failure.

J. I. Case
model "88"
tobacco harvester

Despite absence of bulky structural member, the Case "88" has a great deal of stamina. At work, it carries a crew consisting of six. It is self-powered with a 25hp Case air-cooled engine.

Through research A.O. Smith *... a better way*

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISCONSIN

To enable machine tool users to enjoy the higher surface speeds, longer tool life and finer surface finish possible with constant-quality Diamonite Oxide Cutting Tools, these unique tools are now available through representatives and tool distributors in principal centers. Trained men are ready to help you with machining problems and insure that you get maximum benefits from your Diamonite Tools. Check with them for prices and other information.

ALABAMA

Southern Tool & Machine Co.
P. O. Box 1052
Anniston
ADams 6-7123

CALIFORNIA

Machinists Tool & Supply Co.
3690 Santa Fe Ave.
Los Angeles 58
LUdlow 8-6231

Edwards Tool Co.
2965 Beech St.
San Diego 2
BEImont 4-7316

Brennan-Hamilton Co.
1671 Jerrold Ave.
San Francisco 24
VAlencia 4-9720

Tool & Abrasive Engineering Co.
Bayshore and Commercial
San Jose
CYpress 7-4322

CONNECTICUT

Wetzel Tool Sales Co.
Bridgeport
EDison 4-8598

Wetzel Tool Sales Co.
419 Main St.
E. Hartford
BUtler 9-2748

GEORGIA

Southeastern Machine Tool Co.
500 Piedmont Ave., N. E.
Atlanta 8
TRinity 5-7041

Machine Tool & Engineering Corp.
Conyers
Conyers 7230

ILLINOIS

Excel Tool & Supply Co.
8010 Kenwood Ave.
Chicago 19
SAginaw 1-4949

Trier, Inc.
14415 Greenwood Rd.
Dolton
PUllman 5-0500 (Chicago)

Production Tool & Supply Co.
Rockford
Rockford 4-3843

INDIANA

Jack Gustman & Associates
125 West 30th St.
Indianapolis 8
WAlnut 5-3537

IOWA

Cline Tool & Service Co.
Newton
Newton 1880; 1881

KANSAS

Claude Mann & Associates
2514 East Douglas St.
Wichita
MUrray 2-4579

MAINE

Eugene Roth, Inc.
Robert A. Lufkin
386 Eastern Ave.
Lynn, Mass.
Lynn 8-2073

MASSACHUSETTS

Eugene Roth, Inc.
Robert A. Lufkin
386 Eastern Ave.
Lynn
Lynn 8-2073

MICHIGAN

Central Tool Supply Co.
223 East Michigan Ave.
Battle Creek
WOodward 2-5517

Carbide Tool Co.
1304 Harper Ave.
Detroit 11
TRinity 2-5465

H. J. Nestle Co.
16141 Harper Ave.
Detroit 24
TUxedo 5-4444

MINNESOTA

Northern Machy. & Supply Co.
112 West Allen Ave.
Duluth
RAndolph 4-6734

Northern Machy. & Supply Co.
2001 Washington Ave., S.
Minneapolis 4
FEderal 5-1125

MISSOURI

Wayne Prince & Associates
115-117 East Fifth St.
Kansas City
BAltimore 1-3330

NEW HAMPSHIRE

Eugene Roth, Inc.
Robert A. Lufkin
386 Eastern Ave.
Lynn, Mass.
Lynn 8-2073

NEW JERSEY

A & F Cutter Corp.
91 Edison Pl.
Newark 5
MArket 3-0566

A. B. C. Sales Co.
711 Lehigh Ave.
Union
MUrdock 6-9150

NEW YORK

Wadsworth Manufacturing Assoc.
509 Balsam St.
Liverpool
69-7043 (Syracuse)

OHIO

Cunningham Supply Co.
782 Washington St.
Akron 11
FRanklin 6-4197

Canton Hardware Co.
1221 Third St. N. E.
Canton 2
GLendale 5-0191

General Factory Supplies, Inc.
1167 Harrison Ave.
Cincinnati 14
GArfield 1-1616

The Aldrich Co.
4040 Mayfield Rd.
Cleveland 21
EVergreen 2-2890

U. S. Carbide Tool Sales, Inc.
5633 Brecksville Rd.
Cleveland 31
LAfayette 4-2966

Dayton Industrial Supply Co.
257 Wayne Avenue
Dayton 2
Fulton 6171

Fred C. Ahrendt Co.
3636 Detroit Ave.
Toledo 12
LAwndale 1428; LAwndale 0729

PENNSYLVANIA

J. A. Williams Co.
401 Amberson Ave.
Pittsburgh 6
MUseum 1-5500

Fayjan Tool Sales Co.
P. O. Box 843
Williamsport
Williamsport 3-5283

RHODE ISLAND

Eugene Roth, Inc.
Robert A. Lufkin
386 Eastern Ave.
Lynn, Mass.
Lynn 8-2073

VERMONT

Eugene Roth, Inc.
Robert A. Lufkin
386 Eastern Ave.
Lynn, Mass.
Lynn 8-2073

WASHINGTON

Aronsons Hardware Co.
1415 First Avenue
Seattle
SEneca 1777

WISCONSIN

Allied Tool Products, Inc.
2105 West Auer St.
Milwaukee 5
HIlltop 4-9774

Redi Products Co.
211 South Second St.
Milwaukee 4
BRoadway 3-4800

CANADA

United Nail & Foundry Co.
St. Johns,
Newfoundland

N-T Steel
93 Church St.
Toronto, Ontario
EMpire 6-1851

Thos. Skinner & Son, Ltd.
Vancouver, B. C.
PAcific 3932

DIAMONITE PRODUCTS DIVISION
UNITED STATES CERAMIC TILE COMPANY
CANTON 2, OHIO

is desired, here is a good place to get it.

The second half of the text goes on to give a more or less abbreviated description of several phases of lubrication practice, including application methods, oil purification systems, steam engines, steam and hydraulic turbines, compressors and pneumatic tools, reduction gears, internal combustion engines, and metalworking lubricants, including cutting fluids.

The treatment in the second part of the book is more thorough in some areas than in others. Particular emphasis is given to the kind of equipment found in marine service, such as gears, turbines, and steam and internal-combustion engines. The section on cutting fluids is also quite good.

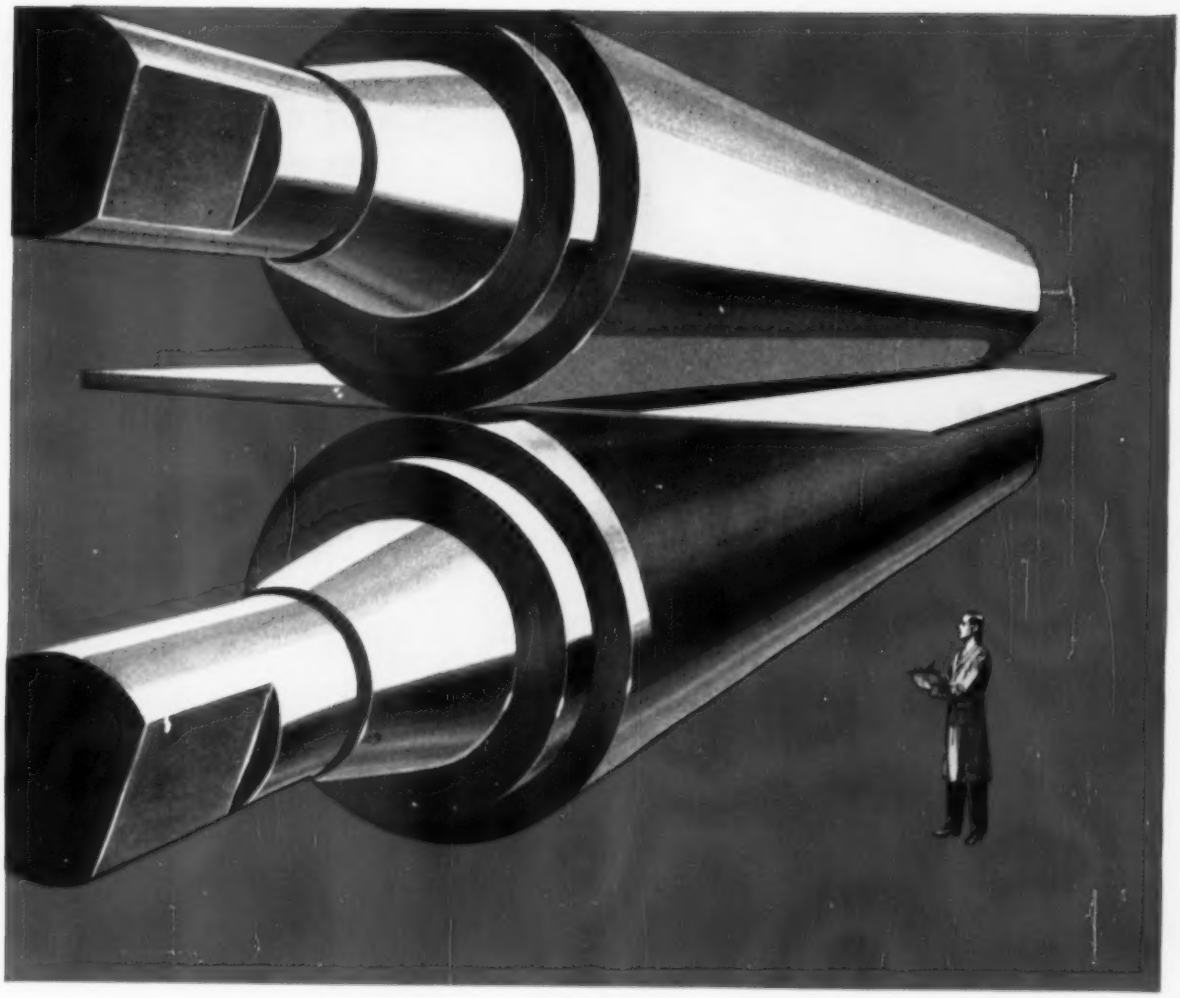
INDUSTRIAL LUBRICATION PRACTICE—*By Paul D Hobson, research associate, Pennsylvania State University. Published by The Industrial Press, 93 Worth St, New York 13. 548 pages. 6 x 9 in. Price, $8.*

Just about every single major aspect of lubrication is covered in this excellent, practical text. Scope of material ranges from a chapter on Organization of a Lubrication Department (with some interesting facts of life) to a discussion of lubrication of chains, ropes, belts, and couplings. Other material includes characteristics of lubricants, lubrication of various kinds of internal-combustion engines, compressors, refrigeration equipment, metalworking machinery, bearings, gears, and so on.

Instead of limiting his subject matter to lubrication alone, the author very sensibly goes into some important related aspects of the problem, such as equipment design and its relation to lubricant effectiveness; and common operating problems which are blamed incorrectly on lubricants, when the trouble really lies elsewhere.

Throughout the book, the emphasis is on practice, rather than theory. Although the book is detailed and thorough, there is a minimum of discussion of the technical reasons for explanations given. This fact makes the book much more useful and readable for the average operating lubrication engineer, whose main job is simply to avoid or correct problems.

The book is exceedingly well written—actually entertaining and, at times, gently amusing. This is a pleasant surprise, considering the potential aridity of the subject.



THE MAN WITH EXPERIENCE IN INDUSTRIAL LUBRICATION

Here's a man with experience, where experience counts, on-the-job experience in heavy industrial lubrication.

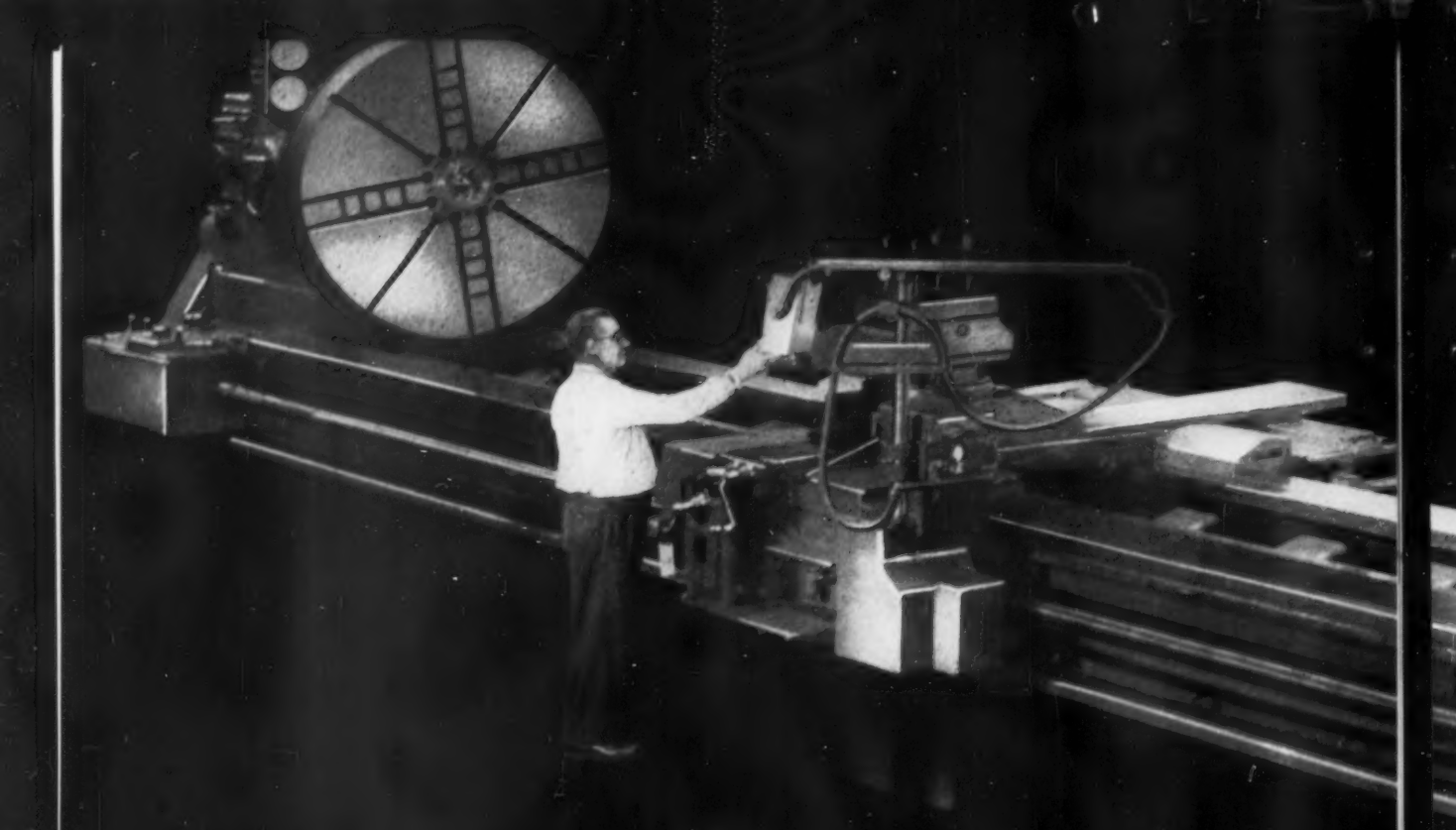
He's a man who is typical of Atlantic service. Selected to represent Atlantic because he *is* a specialist. And he's backed by other Atlantic specialists in lubrication research, production, quality control and transportation.

Atlantic has served customers successfully for 85 years because Atlantic has developed the products necessary to do the lubrication job right at the lowest cost to the lubricant consumer.

Why not benefit by this combination of correct lubricants and technical service? Simply write, wire or phone the Atlantic office nearest you for full information on Atlantic lubricants. The Atlantic Refining Company, M3, 260 South Broad Street, Philadelphia 1, Pa.

ATLANTIC

LUBRICANTS · WAXES
PROCESS PRODUCTS



NILES 72" Heavy-Duty Engine Lathe: Swing over bed and carriage wings is 73½" . . . over carriage bridge, 56". Main drive accommodates 150 hp., adjustable-speed, 4:1 DC motor (with variable voltage drive optional). Speed ranges—1.35 to 101 rpm or 2.2 to 151 rpm (optional).

Metalworking News from HAMILTON!

New NILES 72" Engine Lathe for faster set-ups,

Here's welcome metalworking news from Hamilton! An all-new 72" heavy duty engine lathe to boost your turning speeds and accuracy . . . for top machining quality at lowest cost. It's the Niles A72 Lathe with these exclusive bonus features:

Speed and load indicators on faceplate drive . . . for constant operator check on machine performance. Permits capacity loading with no danger of applying excessive overloads.

Adjustable, springloaded tailstock quill with load indicator . . . for accurate quill spring preloading to suit work piece. Cuts setup time and prevents damage to centers.

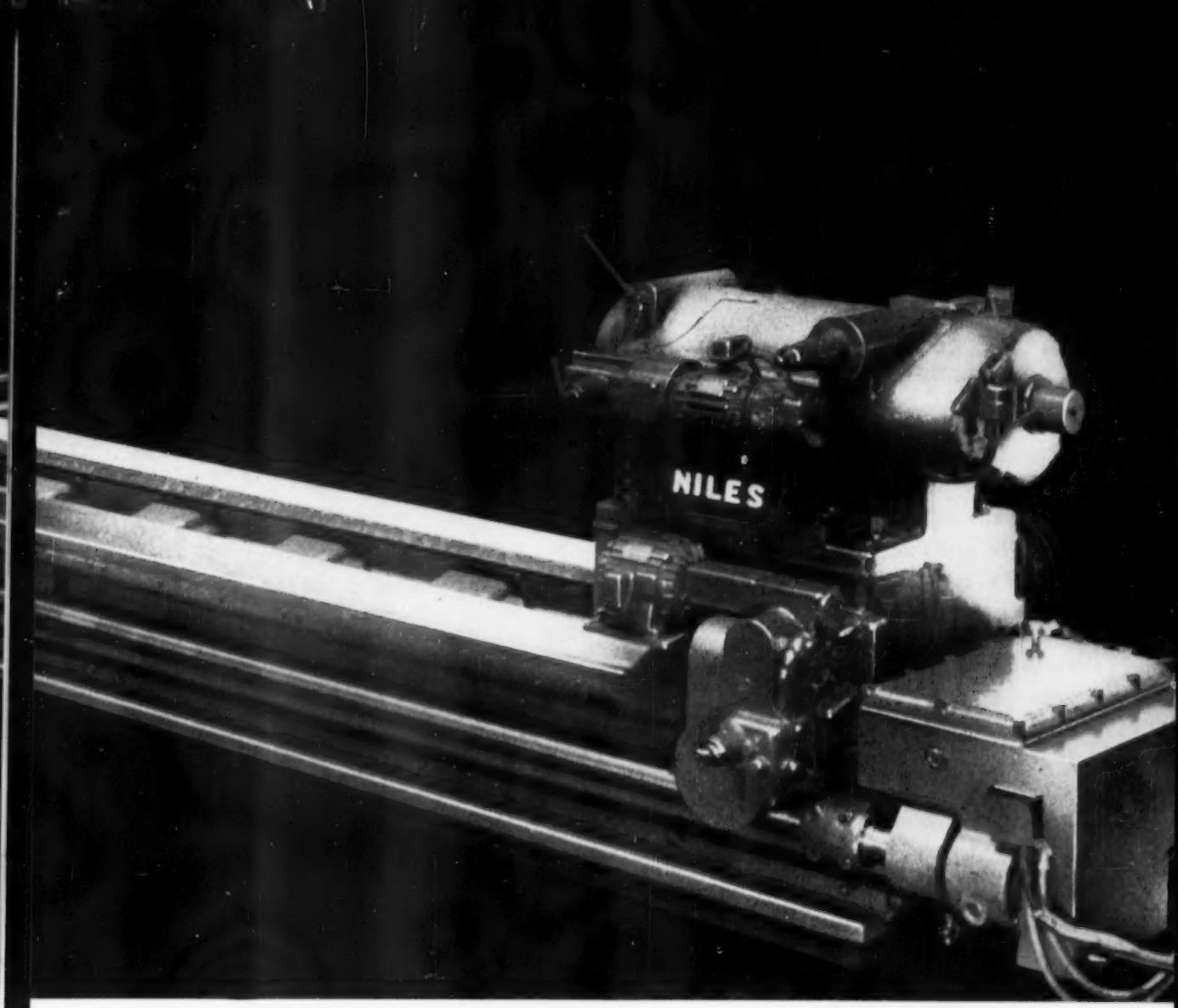
Fully enclosed leadscrew and thread selector dial . . . outmodes old-style tumbler gear selector. Eliminates opening where dust and dirt can enter to contaminate gear lubricant and foul machine operation. *Safer too!*

Hydraulic booster on faceplate speed changer . . . eliminates the heavy manual labor needed to change speeds on other large lathes.

Lubrication oil-pressure safeguard . . . prevents operating machine until positive lubrication is applied.

Optional electronic or mechanical feeds . . . with one lever selection and full pushbutton control at carriage station for either feed. Safety interlocks prevent simultaneous engagement of both. Number of feeds available: 64!

Put this new Niles A72 Lathe on *your* shop floor! You'll speed set-ups, cut machining time and slash operating costs on your heavy duty turning jobs. Easy, accurate controls make child's play of close tolerances. Get complete details on the all-new Niles A72 Lathe today. Send for new bulletin containing full specifications. Address: Dept. 9802, Hamilton Division, BLH Corporation, Hamilton, Ohio.



more accurate turning—at lowest operating cost

Look to HAMILTON for the engineering know-how, experience and facilities that mean outstanding performance *for you* from the full line of NILES Machine Tools:

NILES Heavy Engine Lathes—50″, 60″, 72″, 84″, 96″ and larger

NILES Vertical Boring and Turning Mills—12′, 14′, 16′, 30′ and 43′

NILES Railroad Tools—Hydraulic Centering Machine, End Drive Axle Lathe, Hydraulic Car Wheel Lathe, Hydraulic Diesel and Car Wheel Borers, Hydraulic Axle Burnishing Lathe

HAMILTON Mechanical Presses—single, double and triple action presses for metal forming and stamping; also open back inclinable presses, rail presses, welding presses and die fitting machines

BALDWIN BLH LIMA-HAMILTON

HAMILTON DIVISION
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

time to re-examine

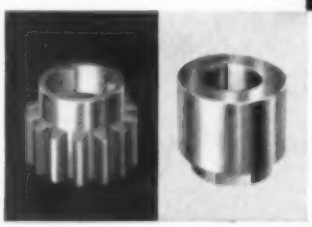
BEARING APPLICATIONS

Striking cost reductions in bearing applications in many mechanical products are made possible by the use of Bunting Sintered Powdered Metal Bearings and parts.

Bunting engineering counsel can guide you in the selection of designs and alloys that will provide bearings of exactly the type, design and material that will fully meet both cost and functional requirements, whether the material be Cast Bronze or Sintered Metal.

A competent group of Bunting Sales Engineers in the field and a soundly established Product Engineering Department put at your command comprehensive data and facts based on wide experience in the designing and use of cast bronze and Sintered Powdered Metal Bearings and parts.

Write to our Product Engineering Department in Toledo or consult our nearest Sales Engineer.



Bunting®

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL

The Bunting Brass and Bronze Company • Toledo 1, Ohio • Branches in Principal Cities

Names in the News . . .

Aaron E Wilcox, formerly assistant master mechanic at Packard Corp, has been appointed master mechanic for Modern Industrial Engineering Co, Detroit.

J E Harling has been appointed operations manager in charge of manufacturing and purchasing activities for both the Pasadena and Los Angeles facilities of Air Logistics Corp. Mr Harling was formerly president and general manager of Wire Co of America.

William R Tonge has been appointed technical manager, de-icers and aeronautical accessories, for the B F Goodrich Co. He succeeds **Charles S Stebbins,** who has been transferred to the B F Goodrich International Co.

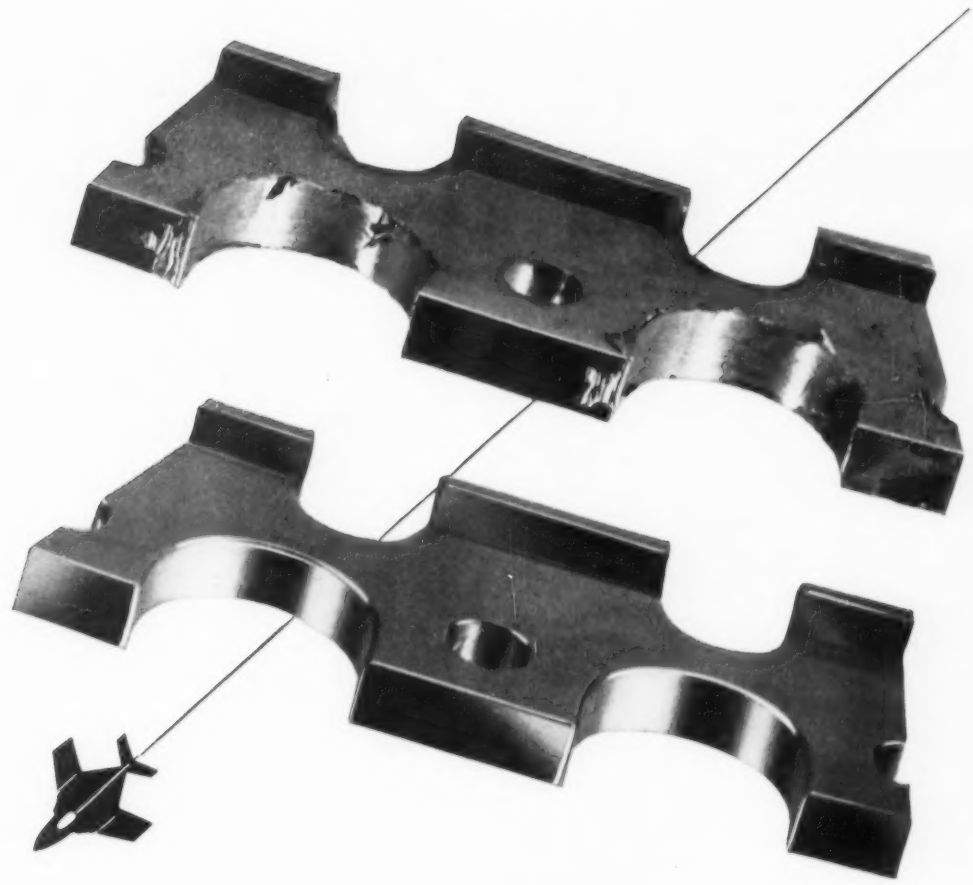
Leroy B Bornhauser, manufacturing manager, transmission, for Chrysler Corp, has been appointed general manager of the Axle & Transmission Division. **Arnold W Hartig,** plant manager of the Detroit Universal Division of Chrysler, has been named a member of the staff of the group vice president, basic manufacturing. **Arthur M Swigert,** works manager of Detroit Universal, has been appointed plant manager there.

Peter C Prior has been named general manager of Smith-Armstrong Forge, Inc, Cleveland company specializing in high speed tool and alloy steel forgings.

E A Williams has been appointed vice president and general manager of H W Loud Machine Works, Pomona, Calif. Mr Williams was previously assistant to the manager of manufacturing control at Lockheed Aircraft Corp.

Richard Schoenfeld, formerly manager of the Wheelco Division of Barber Colman Co, has joined Lindberg Engineering Co, Chicago, as administrative assistant.

John Wallerius, former president of Sigma Metallurgical Co, has been appointed chief engineer of Lindberg Industrial Corp, Chicago.

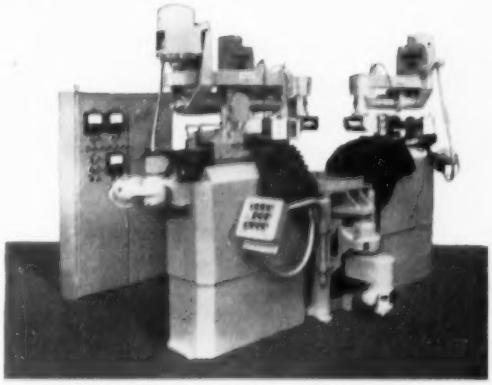


New standard in finishing

EXTREME temperatures and stresses set up in jet engines cause unprecedented strains on metal components.

Fatigue and failure producing concentrations of stress in a ring component—sections shown above—are eliminated by blending surface junctures with Osborn Brushamatic power brushing. Replacing undependable hand methods, power brushing produces the highest quality finish ever achieved. It speeds up production and inspection . . . eliminates rework.

It will pay *you* to have an **O**sborn **B**rushing **A**nalysis made of your finishing operations. Write *The Osborn Manufacturing Company, Dept. C-49, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



Osborn's 51-3L Brushamatic cleans and finishes metallic and non-metallic parts up to 8 feet in diameter, 3500 pounds in weight

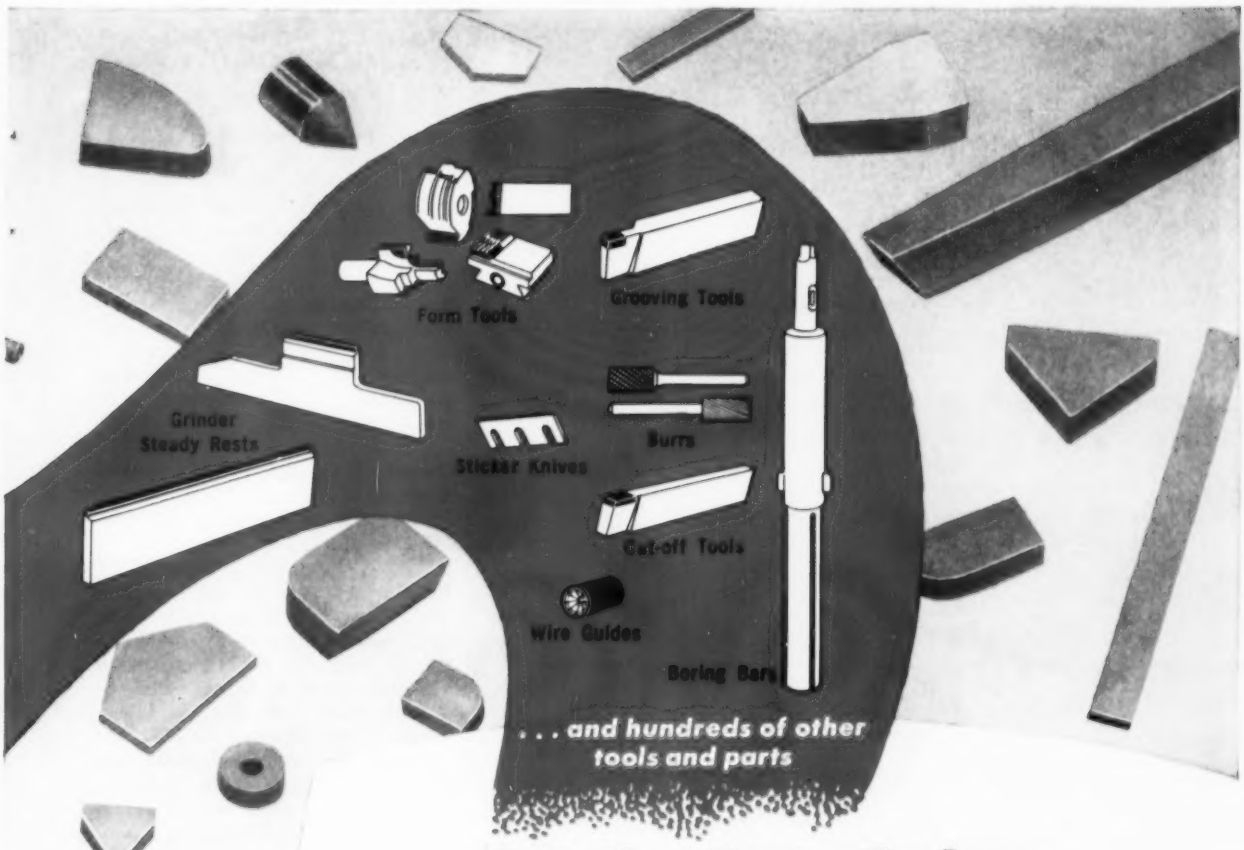
COMPLETE DATA—For information on power brushes and brushing methods write today for Osborn's Catalog 300.

Osborn Brushes

OSBORN

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES
BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

Use V-R Quality Carbides
for Tools and Parts
Like These . . .
Lathe Tools
Circular Saws
Drill Bushings
Wood Cutting Tools
End Mills
Boring Tools
Roller Turner Tools
Turning Tools
Nozzles
Saw Guides
Router Bits
Glass Cutters
Shaper Knives
Slitting Saws
Twist Drills
Reamers
Helical Cutters



Get the Facts Today . . .

Standards. Vascoloy-Ramet manufactures and stocks a complete line of standard cemented carbide blanks for solid and tipped cutting tools . . . wear parts . . . punches . . . dies . . . gages . . . bushings . . . guides . . . mandrels . . . lathe centers . . . chisels . . . router bits . . . end mills . . . and hundreds of other items.

Specials. V-R produces custom made carbide blanks for flat and circular form tools and all special cutting tools and wear parts.

Grades. V-R standard grades of cemented carbides will fit most applications.

Quality. V-R advanced manufacturing and control procedures assure you of consistent uniformity of product.

ASK FOR CATALOG—complete dimensional and price data on hundreds of stock blanks and cutting tools. Call your local V-R Representative or Distributor . . . or write:

C589

Vascoloy-Ramet Corporation

814 Market Street • Waukegan, Illinois

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

Manufacturers of: Cemented Carbides, Toolholders and Tantung Cast Alloy Cutting Tools

HAVE YOU TRIED THIS EXTRAORDINARY CLEANER?

Oakite Rustripper removes rust and heat scale in the same operation that removes oil. It avoids hydrogen embrittlement, damage to machined surfaces and other disadvantages of acid pickling.

Have you taken the four good steps?

How can cleaning costs be reduced 33% while cleaning quality is being improved? *See pages 7 and 8 of booklet.*

What are four easy ways to improve the average rinse tank? *See page 10.*

What causes hydrogen embrittlement during electrocleaning? What is the remedy? *See pages 15 and 16.*

Do you need a brass cleaner that gives better protection against tarnishing?

Oakite has a new brass cleaner that provides scientific protection against the oxygen that tarnishes brass and other copper alloys during the application of reverse current.

"It cut our cleaning rejects by more than 90%"

says a manufacturer who found that Oakite Composition No. 95 gave him:

BRIGHTER PLATING—All films removed . . . no residues, no undersurface shadows, no anodic blackening, nothing to impair the brightness of the electroplate.

FEWER REJECTS—Major causes of blistering and peeling eliminated . . . Consistent success in baking for 60 minutes at 300°F.

OAKITE PRODUCTS, INC.
24 Rector Street, New York 6, N. Y.

Send me the FREE booklets indicated below:

- ☐ Here's the best shortcut in the field of electroplating
- ☐ Four good steps toward better electroplating on steel
- ☐ What's NEW for electrocleaning brass and other copper alloys
- ☐ Good news about electrocleaning zinc-base die castings

NAME _____

COMPANY _____

ADDRESS _____

FREE
For further information, ask for booklet

OAKITE

Technical Service Representatives in Principal Cities of U.S. and Canada

Frank J Finn, superintendent of quality control at Yale & Towne's Salem, Va, plant, has been named plant manager.

Allan S Robertson has joined Fenwal Incorporated, Ashland, Mass, as vice president, sales. He was formerly sales manager of the Union Switch and Signal Division of Westinghouse Air Brake Co.

Leo M Monroe has been appointed manager of industrial equipment sales for Brush Electronics Co, Cleveland. He previously served as an industrial sales engineer with the Celotex Corp.

Robert C Conant, quality control manager of Aeroquip Corp, Jackson, Mich, has been named manufacturing manager.

J E Rheim, executive vice president of Rohr Aircraft Corp, Chula Vista, Calif, has been elected president and general manager. He succeeds **Fred H Rohr,** named board chairman and chief executive officer.

Robert L Jenkins, methods manager of Chrysler Corp's Dodge Division, has been promoted to general superintendent, car manufacturing. **Richard A Vining,** master mechanic, has been named production engineering manager.

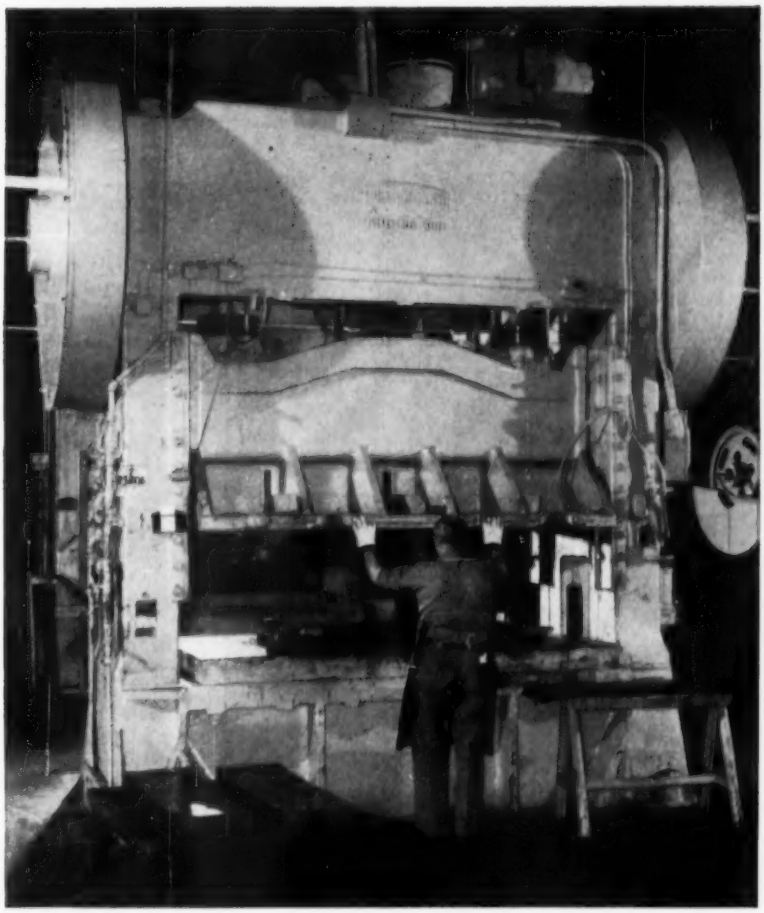
Walker G Dollmeyer, formerly vice president, manufacturing, of Toledo Scale Co, Toledo, Ohio, has joined Solar Aircraft Co, San Diego, Calif, as vice president operations.

Richard H Melvin, sales engineer for Sahlin Engineering Co, Birmingham, Mich, has been appointed sales manager.

David W Singley, superintendent of industrial manufacturing for the Henry Disston Division of H K Porter Co, has been appointed general superintendent.

Jules Cardon has been named to head the newly created industrial sales department of Servo Corp of America, New Hyde Park, NY.

L M Gray, assistant to the chief engineer of Clark Equipment Co's Axle Division, Buchanan, Mich, has been advanced to chief engineer. He succeeds **G C Vanderberg,** appointed engineering consultant. **William E White,** product engineer, has been named new development engineer.



The Cleveland Double-Crank Press shown here draws more than seven parts for the famous Servel Refrigerator.

SERVEL, INC. finds Cleveland Presses

"require very little maintenance . . . have no clutch problems"

Installed in the Home Appliance Division of SERVEL, INC., Evansville, Indiana, in March of 1951, the Cleveland Double Crank Press you see here has been constantly "on the job" producing parts for famous Servel refrigerators.

Carl Linke, Foreman of the Sheet Metal Department, says, "This Cleveland 80D is a good press. We've used it for most of our draw work for the past five years. During this time it has required very little maintenance. We've had no clutch maintenance problems."

As have many of the nation's leading stamping departments, you, too, will find that Cleveland Presses prove themselves to be easy-to-maintain, low-cost producers. Before buying your next press be sure you have the complete Cleveland story. One of the 11 specialized types of Cleveland Presses is sure to be your answer to greater stamping economy. Write or call today!

THE CLEVELAND PUNCH & SHEAR WORKS CO.

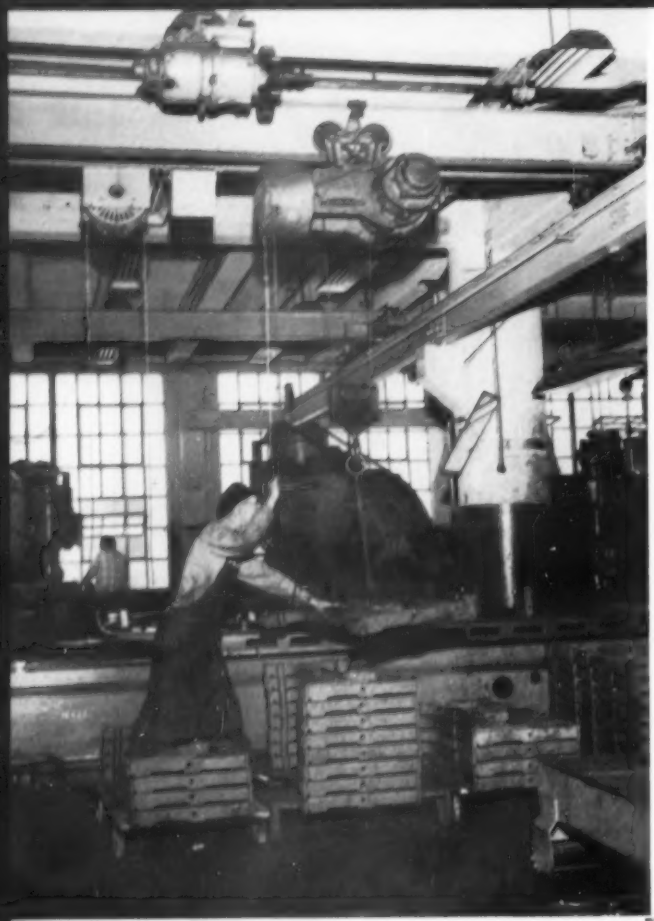
Established 1880

POWER PRESSES – FABRICATING TOOLS

E. 40th & St. Clair Avenue, Cleveland 14, Ohio

Offices at: NEW YORK • CHICAGO • DETROIT
PHILADELPHIA • E. LANSING

CITY FOUNDRY DIVISION · SMALL TOOL DEPARTMENT

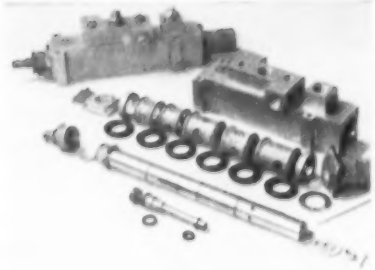


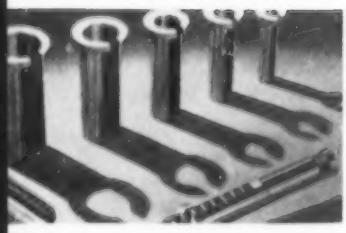
Latest production

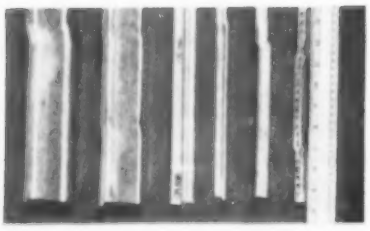
MATERIALS AND AND SERVICES

coming Mid-November, 1956 and Buyer's Guide Issue

New York—Problem-solving, idea stimulating "Nuggets"—the essence of previously published articles in AM covering materials and components, and materials handling and services will be found in Section G and H of your 1957 Production Planbook and Buyer's Guide Issue to be published by American Machinist Mid-November, 1956.







ideas on . . .

COMPONENTS • MATERIALS HANDLING

in AM's 1957 Production Plan-book

The properties and uses of materials vital to every Metalworking shop or plant—cast iron, steel, copper, brass, aluminum, titanium, magnesium and alloys of these and other materials; whether sheet, plate or bar stock; many kinds of plastics; as well as new application ideas on such components as gears, valves, hydraulic and pneumatic mechanisms, electric motors and controls, bearings and numerous other parts and components incorporated into the finished products manufactured by Metalworking plants will be found in Section G "Nuggets."

"How-to-move-it" materials handling ideas and equipment—fork-lift and conveyor, crane hoist and pallet—plus many automation developments not classified elsewhere; and plant services such as inventory and work-in-process systems; waste disposal, salvage and ventilating and air conditioning ideas will appear in Section H.

Ready Production Guidebook

Other sections of the issue will contain time-saving "Nuggets" also classified by topic—management and personnel; machining and tooling; presswork, molding and casting; inspection, testing and quality control and assembly, heat-treat and finishing, as shown at right. Each production "Nugget" in each section will bear the issue date and page number of American Machinist from which it has been condensed for easy reference if you want more specific details, drawings, charts or diagrams and full text.

"Developments to Watch in '57"

Invaluable checklists of modern Metalworking ideas and techniques, a constant every-day challenge to boost production and guard against obsolescence, to be published in each section, will enable you to relate your operations to Metalworking plants all over the country.

Manufacturers Free Literature lists in each section will provide an opportunity to get complete information while production ideas stimulated by the "Nuggets" and Developments to Watch in '57 are fresh.

"Who-Makes-What" Buyer's Guide

An authoritative, complete Buyer's Guide section listing almost 7000 sources of supply under nearly 1500 headings—particularly useful when you select production equipment, materials, parts, components or supplies—will be an outstanding new feature forming an authoritative "Where-to-buy-it" directory of suppliers' names and addresses.

A Year-Round Reference Issue

Sent as part of AM's regular editorial service to subscribers, the 1957 Production Planbook and Buyer's Guide Issue is Metalworking's sole single-issue reference volume of "How - to - do - it," "What-to-do-it-with," "Where-to-buy-it" production ideas with year-round usefulness. Its thumb-indexing and flat-opening pages make it exceptionally easy to use frequently. It's an issue you will want to keep always within arm's reach.

1957 OUTLOOK

MANAGEMENT, PERSONNEL A

MACHINING B

TOOLING C

PRESSWORKING, MOLDING, CASTING D

INSPECTION, TESTING, QUALITY CONTROL E

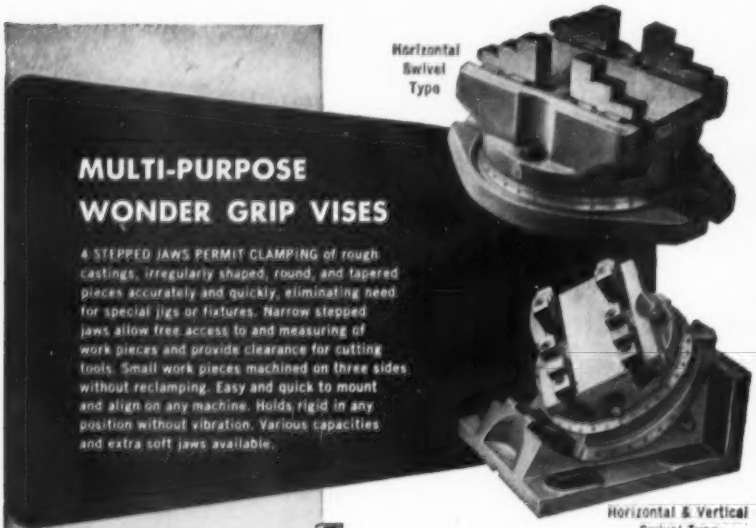
ASSEMBLY, HEAT-TREAT, FINISHING, (ASSEMBLY INCLUDES WELDING & PORTABLE TOOLS) F

MATERIALS, COMPONENTS G

MATERIALS HANDLING, SERVICES H

PRIZE IDEAS, REBUILT EQUIPMENT I

BUYER'S GUIDE J



MULTI-PURPOSE WONDER GRIP VISES

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

Horizontal & Vertical Swivel Type

TAPPING ATTACHMENTS

Reversible safety tapping attachments with adjustable graduated friction drive, hardened, ground and lapped, complete with torque bar and handles. Precision made throughout by long established reputable West German factory.

Tested for Performance to High Amer. Standards
Immediate Delivery from N.Y. Stock

MADE IN GERMANY

Low Competitive Prices

- Quick Change Chucks and Collets
- Wille-Grip Keyless Drill Chucks
- Milling Machine Arbors, Adapters, Arbor Spacers and Bearings
- Lathe Mandrels

MBI

Our Headquarters in New York City

Write for complete details and prices to Dept. 20

M.B.I. EXPORT & IMPORT LTD.

A Division of Machinery Builders Inc.

475 Grand Concourse, Bronx 51, N. Y.

"Over 20 years experience in designing and building machinery"

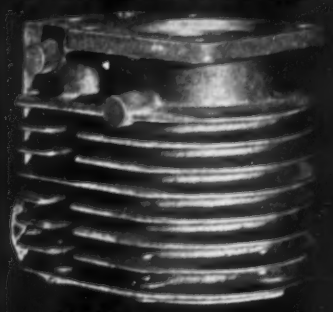
CABLE ADDRESS: Machbuild New York

Phone: MOtt Haven 5-0900

DISTRIBUTOR INQUIRIES INVITED

Also United States Distributors of European Machine Tools

USER SAYS TAP LIFE UP 43% ON THIS THIN-WALLED CASTING



...thanks to

FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 16, Niagara Falls, N.Y. 44-96

CARBORUNDUM®

The modern metalworking fact you want— *when you want it!*

Great news for all concerned with metalworking! Now you can have a famous reference in entirely modernized form. THE NEW AMERICAN MACHINIST'S HANDBOOK brings you today's practice—today's needed data—in profusion.

The **NEW**

AMERICAN MACHINIST'S HANDBOOK

BIGGEST IMPROVEMENT IN NEARLY 50 YEARS!
80% rewritten
Fully up to date
1579 pages
774 illustrations
45 big sections
$11.00
EASY TERMS
FREE TRIAL!

Edited by RUPERT LE GRAND Senior Assoc. Ed., AMERICAN MACHINIST
Based on AMERICAN MACHINISTS' HANDBOOK by Colvin & Stanley

Answers hundreds of machine shop and drafting room questions — layouts, feeds, speeds, tools, jigs, fixtures, materials, standards, tolerances, forming and finishing, and many others. Means time and money saved—better results.

McGRAW-HILL BOOK CO.,
327 W. 41 St., N. Y. 36, N. Y.

Send me Le Grand's THE NEW AMERICAN MACHINIST'S HANDBOOK for 10 days' examination on approval. If satisfactory I will send (check one) ☐ $3 in 10 days and $3 a month until $11 is paid, or ☐ full purchase price of book. (We pay delivery cost if remittance accompanies this coupon. Same examination and return privilege.)

(Print)
Name .....
Address .....
City ..... Zone ..... State .....
Company .....
Position .....

For price and terms outside U.S., write McGraw-Hill Int'l., N.Y.C. FA 8-27-56

Handle your small part precision JIG BORING on the LINLEY JIG BORER

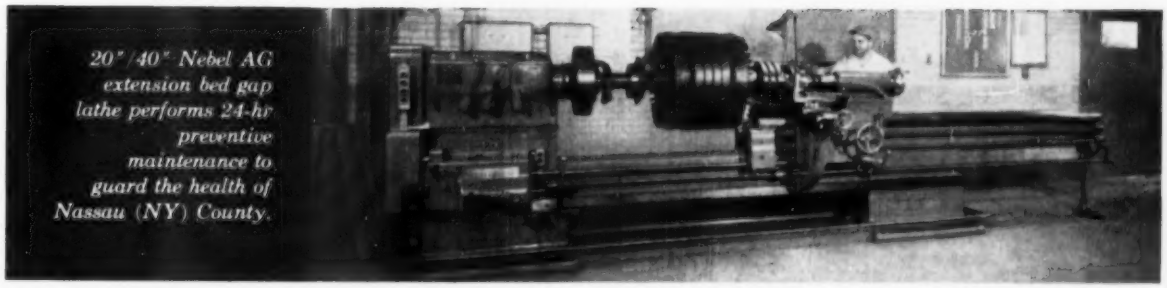
Why tie up your big, costly jig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work. Put your small work on the LINLEY *where it belongs* and reserve your large machines for large work, *where large work belongs*. You'll save money this way.

SPECIFICATIONS

Table Movement: 6" x 10" — Table Size: 7" x 17½"

Complete details sent promptly on request

LINLEY BROTHERS CO.
664 STATE ST. EXT., BRIDGEPORT 1, CONN.



20"/40" Nebel AG extension bed gap lathe performs 24-hr preventive maintenance to guard the health of Nassau (NY) County.

Nebel lathes essential when there's

NO TIME FOR DOWNTIME

"The health of our community depends to a large degree upon the dependability and the great, adjustable capacity of our Nebel extension bed gap lathe," states Mr. Anton E. Sparr, superintendent, Nassau County Sanitation Disposal Plant.

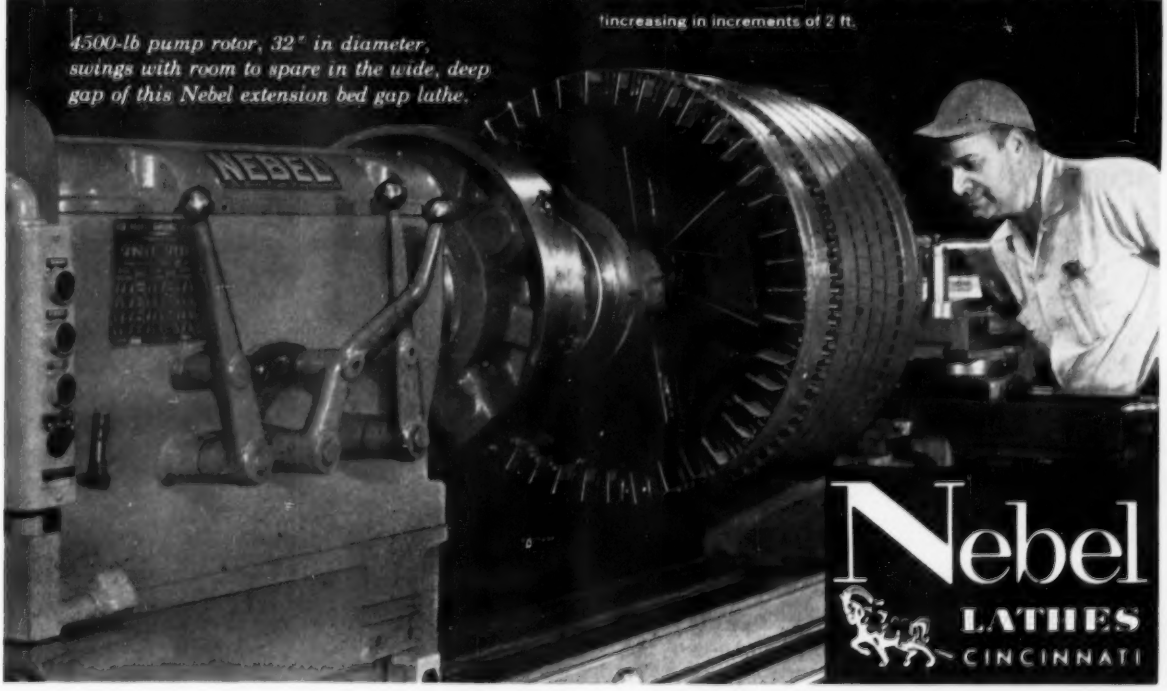
"It has served us without interruption . . . and the almost unlimited swing and center distance capacity has proved so valuable that it has returned a third of the purchase price in less than two years.

"And by doing our own maintenance machining, we eliminate in-transit damage to delicate and valuable parts (pump rotor value: $3,000), have closer control and save valuable time."

This dependable performance and adjustable swing and center distance capacity is available in three different Nebel models . . . see specification chart below. Shouldn't these modern, pay-for-themselves facilities be on the job in your plant? For complete information, write today for descriptive bulletins. Nebel Machine Tool Co., 3407 Central Parkway, Cincinnati 25, Ohio.

	Swing over ways	Swing thru gap	Width of gap	Bed length† minimum	Center Distance gap opened	Spindle speeds range, rpm	Motor Recommended
Imperial 20"/40"	24½"	42"	32"	8 ft.	5' 4"	11-666 or 16-1000	15-20
AG series 20"/40"	22½"	40"	24"	6 ft.	4' 0"	9-280 or 16-500	7½-10
G series 28"/50"	29"	52"	41"	10 ft.	7' 5"	5-230 or 10-460	20-25

†increasing in increments of 2 ft.



4500-lb pump rotor, 32" in diameter, swings with room to spare in the wide, deep gap of this Nebel extension bed gap lathe.

Faster, easier welding of work pieces up to ½ ton with

FREE-HAND ROTATION

of the new P&H Model UP-1000 Welding Positioner

Costs shrink when you install this new P&H Model UP-1000 Positioner. A light touch of the hand rotates the work piece to any position — permitting faster, easier welding. And this easy-to-use P&H Positioner also revolves a full 360° in two planes to provide cost-cutting downhand welding on all types of weldments.

Designed for weldments up to ½ ton, this P&H Positioner maintains static balance in all positions, even when the arm is adjusted up or down to horizontal settings. Because the UP-1000 has a protected friction clutch, you get positive braking of rotation — the weldment is always securely fixed right where you want it.

For greater welding efficiency, safety, and improved quality, use the P&H UP-1000 on all jobs up to 1000 pounds. Send in the coupon for Bulletin P-22.

HARNISCHFEGER
MILWAUKEE 46, WISCONSIN

I'M SMOOTH-ARC SCOTTY...and I'm a hard man with a penny. That's why I recommend our FREE bulletin on the new P&H UP-1000. It tells you how to save time and money. Send for it.

P&H UP-1000 Positioner for all jobs up to 1000 pounds. 26 other P&H Positioner Models to choose from.

P&H

HARNISCHFEGER CORPORATION
Welding Division
4514 W. National Avenue, Milwaukee 46, Wis.
Attention: W. R. Stephens, Sales Manager

Please send me Bulletin P-22 with information on the P&H UP-1000 Positioner.

Name _____ Title _____

Company _____

Company Address _____

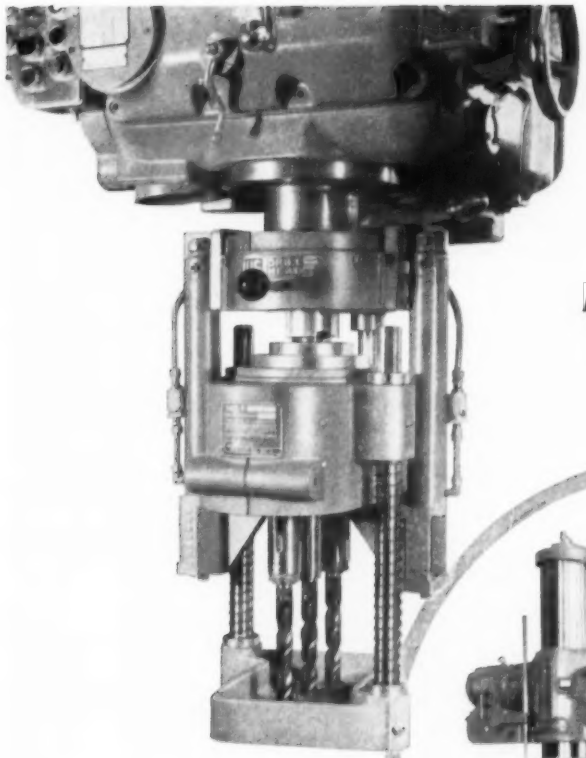
City _____ Zone ____ State _____

3084

MAIL COUPON *today!*

the P&H *Line*

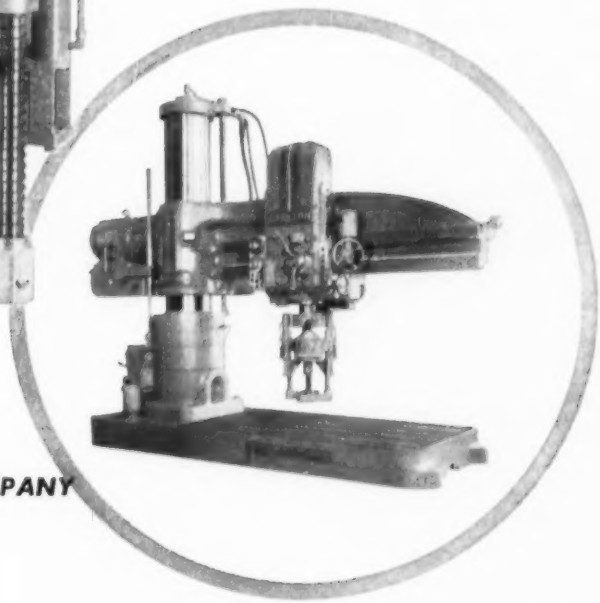
P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada



NEW

AIR COUNTERBALANCE SWIVEL ATTACHMENT

FOR RADIAL DRILLING MACHINES



THIS IS ANOTHER FIRST FOR THE U. S. DRILL HEAD COMPANY

This new combination Swivel and Air Counterbalance attachment makes it possible to adapt large multiple spindle drill and tapping heads to radial drilling machines.

Flexible and easily adjusted, it insures maximum safety for the operator, as well as better operating economy.

Two cylinders maintain a balanced condition of the head on the machine, with the air in the counterbalancing setup being controlled on both ends of the stroke. Therefore, only sufficient pressure is maintained to counterbalance the weight of the head during all portions of the stroke. On the return stroke, the air is controlled to prevent extreme, quick return of the head. Attachment includes air filter, pressure regulator, and an air oiler, and incorporates a 360° swivel feature fully aligning the drill head. It operates equally well with the fixed center type head and the adjustable type head.

This package is ideally suited for drilling condenser plates, boiler tube sheets, flue sheets, etc.

FOR MEN WHO KNOW DRILL HEADS BEST, IT'S ALWAYS U. S. DRILL HEAD — FIVE TO ONE

Manufacturers of all types of Fixed Center, Adjustable, and Individual Lead Screw Tapping Heads.

US DRILL HEAD

THE UNITED STATES DRILL HEAD COMPANY

BURNS STREET • CINCINNATI 4, OHIO

IMPORTANT NOTICE

The Genuine MAUSER VERNIER CALIPER

IS NOW MADE OF STAINLESS STEEL THROUGHOUT

AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED

- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
- SPECIALLY LONG VERNIER to read thousandths
- 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

GEORGE SCHERR CO., Inc.

200 AM LAFAYETTE ST. · N. Y. 12, N. Y.

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1 in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

Now...Free

New SLIDE GUIDE

With this new and different slide rule type comparison chart you can check 21 essential specifications of 8 leading heavy duty milling machines. Compare their capacity, speeds, feeds, etc., at a glance.

Just fill in the coupon, and mail the entire ad for your FREE copy.

"MAIL ENTIRE AD TODAY!"

GREAVES MACHINE TOOL COMPANY
2100 Eastern Avenue, Cincinnati 2, Ohio
Send me my FREE copy of the "Slide-Guide"

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

Specify IDEAL LIVE CENTERS

Guaranteed to match the accuracy and capacity of your lathe

Widest range of models, load capacities and tapers for every job!

ORDER FROM YOUR IDEAL DISTRIBUTOR OR MAIL COUPON

IDEAL INDUSTRIES, Inc.
1057 Park Ave., Sycamore, Illinois

Kindly send us data on Ideal's complete line of LIVE CENTERS.

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

CANADIAN DISTRIBUTOR: Irving Smith, Ltd., Montreal

dixi 60

horizontal optical jig borer

with 5 optical microscopes

DESIGNED AND BUILT FOR:

VERSATILITY
Optical settings for operations in all planes and compound angles . . . Equally suitable for tooling, short-run or production work . . .

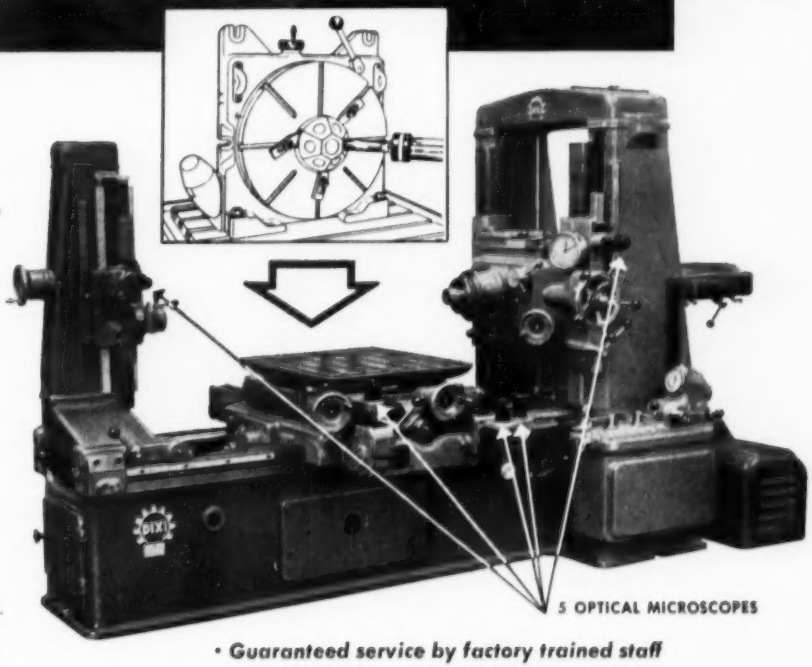
ACCURACY
Overall accuracy of .0002"

A precision machine for *JIGLESS* boring, facing, milling, and drilling work, in all planes. Built-in 360° optical rotary table, 28¾" x 32⅝". All spindle and table settings by optical microscopes. Infinitely variable hydraulic feeds. Mechanical spindle feeds with automatic depth stop. #40 taper spindle-speeds infinitely variable to 1400 R.P.M. Special features eliminate effect of spindle overhang on accuracy.

DIXI 450 PRECISION OPTICAL CIRCULAR DIVIDING TABLE

Direct readings of 1 sec.

(See insert picture above) rigidly mounted (not tilting) on built-in rotary table permits holding close tolerance relations between bores in all planes, including bores at compound angles. ALL IN ONE SET-UP. All sides of the work piece except the mounting face machined in one set-up.



5 OPTICAL MICROSCOPES

- ***Guaranteed service by factory trained staff***
- ***Engineering staff available for consultation***
- ***Spare Parts in New York stock***
- ***Your operators trained***

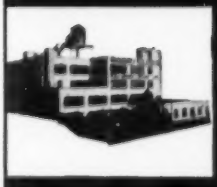
DIXI 60 now in wide use in leading Aircraft and Manufacturing Plants throughout the United States.

Names available upon request

SEE THIS VERSATILE MACHINE IN OPERATION

at our New York or Cleveland Show Rooms. Write for Complete descriptive literature and prices to Department 21. Catalogues on additional production equipment also available on request.

MBI



Our Headquarters in New York City

M.B.I.

export & import ltd.

A Division of Machinery Builders, Inc.

475 Grand Concourse, Bronx 51, N. Y.

Over 20 years experience in designing & building machinery

Phone: MOtt Haven 5-0900

ECONOMY

Automatic
POINTING MACHINES
for bolt and cap screw pointing

TYPE 4600

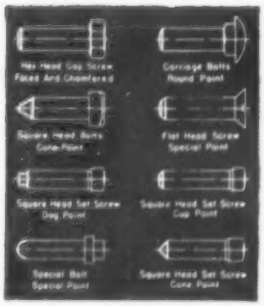
ECONOMY Automatic Pointing Machines are hopper fed and automatic in operation. These features enable operator to run several machines resulting in greater productivity and lower costs.

These Automatic Pointers are available in two sizes—Type 3300 for uniformly pointing bolts and screws to 5/8" diameter and 3/4" to 3-1/2" in length, the type 4600 for pointing bolts and cap screws 1/4" to 3/4" diameter and 1" to 6" in length. A single machine will handle all types of points on many types of bolts and cap screws.

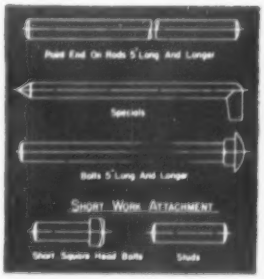
Production rates of the type 3300 vary infinitely from 2,000 to 6,000 finished parts per hour and on the type 4600 from 1800 to 5400 per hour.

Also available is the type "P" Semi-Automatic Pointing Machine for pointing bolts, cap screws, studs and rods 1/4" to 1-1/2" diameter, 5" or more in length. Production rates up to 2,000 pieces per hour make it a valuable secondary machine for short runs.

Consult ECONOMY on low cost, high production Bolt and Screw Pointing operations.



Typical parts machined on the TYPE 4600



Typical operations performed on TYPE "P" Semi-Automatic Pointing Machines

THE ECONOMY LINE

Automatic Shaving Machines
Automatic Pointing & Shaving Machines
Automatic Pointing Machines
Semi-automatic Pointing Machines
Automatic Pointing & Threading Machines
Double End Automatic Pointing Machines

THE ECONOMY ENGINEERING CO.
WILLOUGHBY, OHIO
WILLOUGHBY-OHIO

Designers and Manufacturers of Secondary Operation Machines since 1915

BUZZER ® Reg. U. S. Pat. Off.

INDUSTRIAL *GAS* EQUIPMENT

NO BLOWER OR OTHER POWER NEEDED

JUST CONNECT TO GAS SUPPLY

BUZZER Equipment, a buy-word since 1911, provides the hottest and quickest heating . . . without blower or power. Wide range of turn down and heat control. You can depend on a BUZZER.

Send for complete BUZZER Catalog

Oven Furnaces

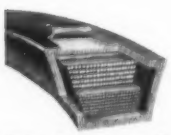
Mfrs. since 1911

CHARLES A. HONES, Inc.
126 SO. GRAND AVE., BALDWIN, L. I., N. Y.
BURNERS - FURNACES (Heat Treating, Melting, Soldering)

DODGE PRODUCTS You Should Know-

TAPER-LOCK
ALL-STEEL
CONVEYOR PULLEYS

DIAMOND D
FRICTION CLUTCHES



SEALED-LIFE V-BELTS

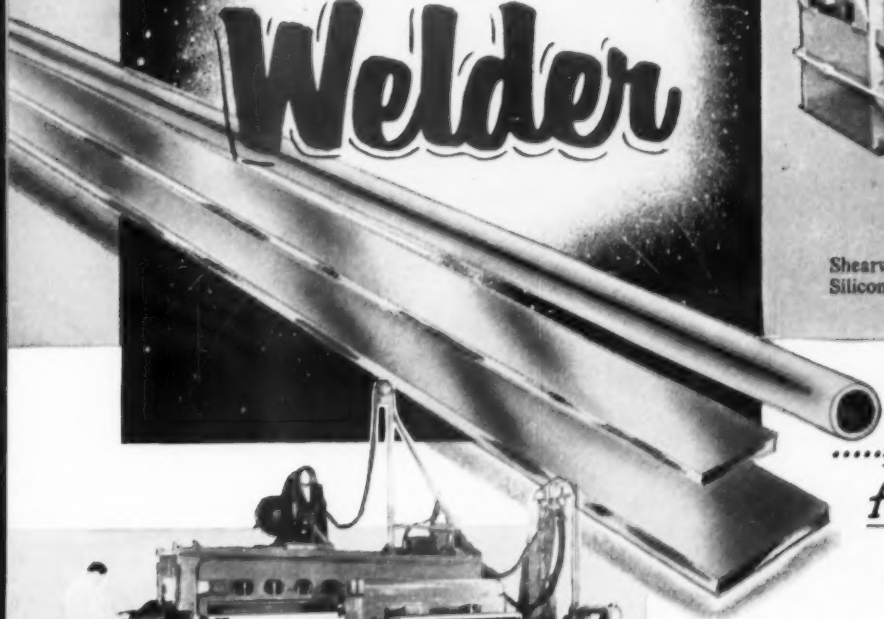
Dodge Bulletins you should have-

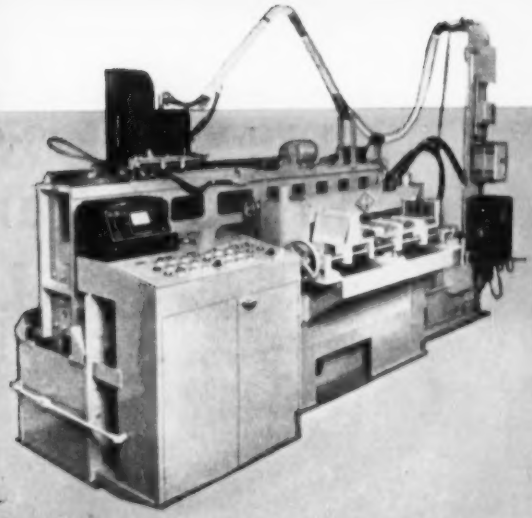
- ☒ Taper-Lock Steel Conveyor Pulleys. Construction details, sizes, dimensions. Bulletin D56.
- ☒ Clutches. Technical data and selection tables for Diamond D, Rolling Grip, Air-Grip Clutches. Bulletin D56.
- ☒ Sealed-Life V-Belts. Construction details and data on sizes, pitch lengths and outside lengths. Bulletin A606.

Write for your copies.

DODGE
of Mishawaka, Ind.
DODGE MANUFACTURING CORPORATION
100 Union Street • Mishawaka, Indiana

THE NEW MPM Shear Welder

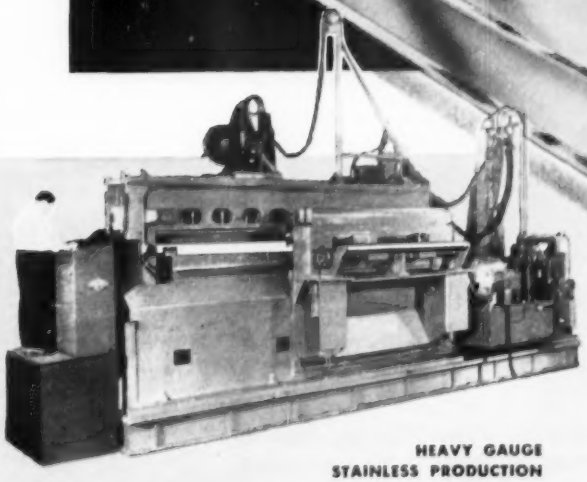




CONTINUOUS SILICON SHEET PRODUCTION

Shearwelder for coil build up line for 42" wide Silicon Steel from .015" to .030" thick.

.....more automation for even faster Steel Production!



HEAVY GAUGE STAINLESS PRODUCTION

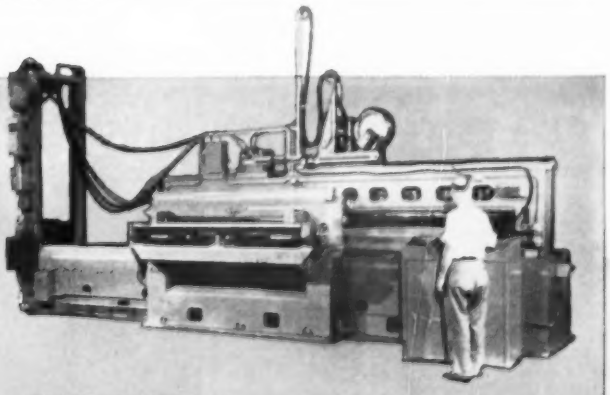
Shearwelder for butt welding 60" wide x .250" thick Stainless Steel.

● Metal Processing Machine Company's new Shearwelders are outstanding because of their advanced design incorporating automatically sequenced operations.

Shearing and welding are performed at the same station with positive clamping right at the work area, thereby insuring perfectly aligned butt welds.

"M.P.M." welds are **extremely ductile,** permitting subsequent rolling, forming, or blanking operations. Weld joints are smooth and require **no trimming.**

Rugged construction is insurance for minimum maintenance and compact design saves floor space.



MAJOR COIL BUILD UP

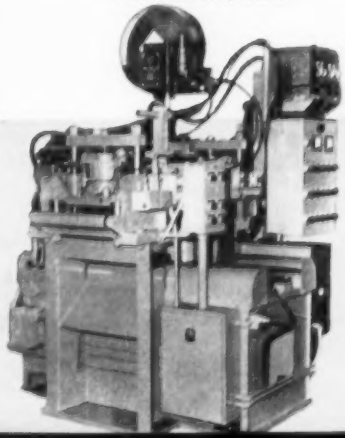
Shearwelder for Carbon Steel coil build up line for .015" to .060" thick x 72" maximum width.

10065

THE METAL PROCESSING MACHINE CO.

DIVISION OF McKAY MACHINE CO.
YOUNGSTOWN, OHIO

McK MPM

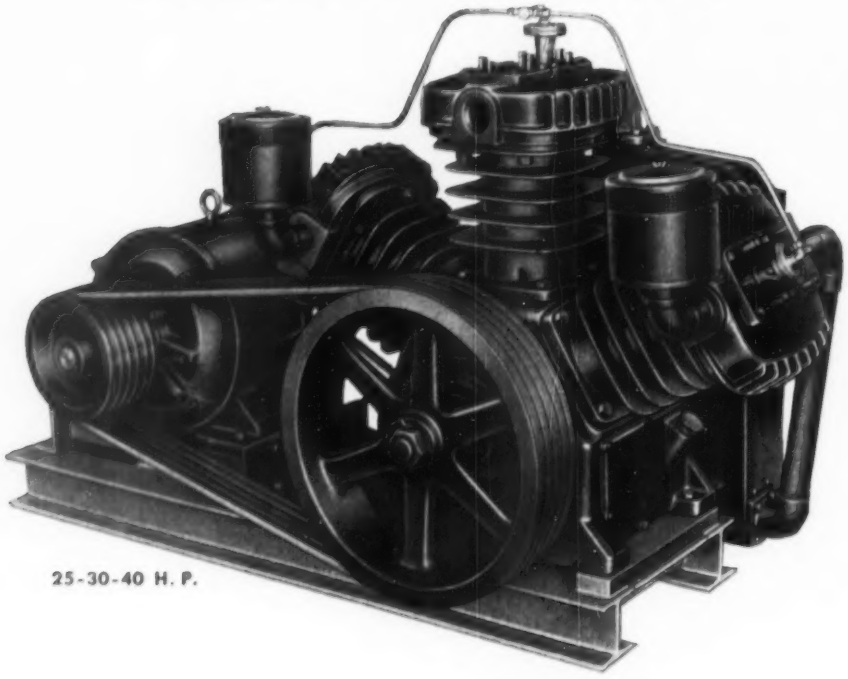


CONTINUOUS TUBE MILL PRODUCTION

Shearwelder used with strip looping device for splicing coil to coil to permit continuous production of tube mill.

THE NEW CURTIS MODEL C-100
TWO-STAGE, AIR-COOLED AIR COMPRESSOR

Provides Higher Operating Efficiency Costs Less to Install



25-30-40 H. P.

THIS NEW Curtis Two-Stage will deliver more air per minute, per horsepower and per kilowatt hour of electrical energy consumed, thus assuring a saving in your electrical bill.

It's Air Cooled, thereby eliminating expensive water bills and assuring quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

For complete information write for illustrated folder.

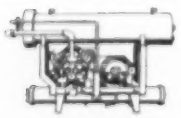
Remember, you can count on OUR 102nd YEAR

Curtis

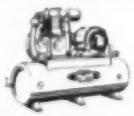
MANUFACTURING COMPANY • PNEUMATIC DIVISION

1924 KIENLEN AVE. • ST. LOUIS 20, MO. CM-6

AIR HOISTS
AIR CYLINDERS



PACKAGED LIQUID
CHILLERS



AUTOMOTIVE
AIR COMPRESSORS

AUTO LIFTS

PACKAGED
AND
REMOTE
AIR
CONDITIONING

Crankshaft Machine Company uses La Salle's

NEW fatigue-proof STEEL BARS

to replace heat-treated alloy

- **140-150,000 PSI TENSILE**
- **MACHINES 50-100% FASTER**

FATIGUE-PROOF is specified in this automated turning machine manufactured by Crankshaft Machine Company, Jackson, Michigan.

This $60,000 machine uses FATIGUE-PROOF for a vital part. The rack that actuates the loading mechanism formerly was heat-treated alloy and is now FATIGUE-PROOF.

This is an automatic crankshaft turning machine that operates in automotive production lines. It must run dependably. The engine line can't wait for machine repairs.

The rack itself is intricate and machining it was a problem. FATIGUE-PROOF solved that, and it did so at no risk to the machine!

If you are producing parts requiring tensile strengths in the 140,000 to 150,000 p.s.i. range . . if you are interested in a steel bar that has this strength without heat treating . . if you want to trim production costs with a bar that machines faster (25% faster than annealed alloys, 50% to 100% faster than heat-treated alloys) . . if you want to eliminate the cost and inconvenience of heat treating, we invite you to send us a blueprint or detailed description of your application or, better yet, pick up your telephone and call your nearest La Salle Sales Engineer.

TEST FATIGUE-PROOF! If it appears that FATIGUE-PROOF can help improve the quality of your product or cut your production costs, your La Salle Sales Engineer will be glad to furnish you with a sample bar for testing in your own plant.

NEWLY PUBLISHED!

Ask for your copy of this 20-page booklet which gives detailed information on the remarkable new FATIGUE-PROOF . . 29 pictures, tables, charts.

LA SALLE STEEL CO.
1416 150th Street
Hammond, Indiana

Please send me your "FATIGUE-PROOF" Bulletin.

Name_____

Title_____

Company_____

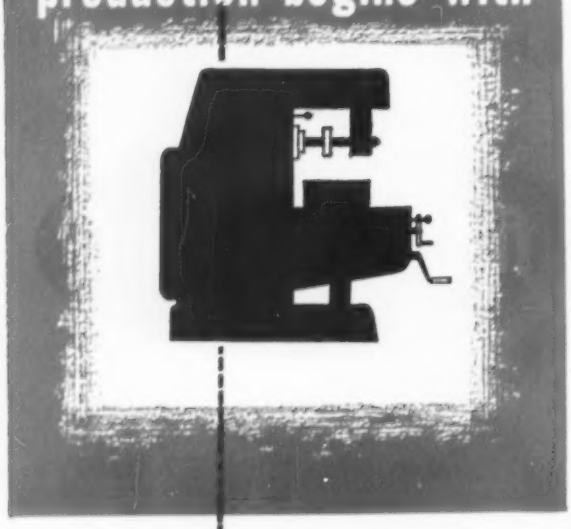
Address_____

City_____ Zone____ State_____

La Salle STEEL CO.
1416 150TH STREET, HAMMOND, INDIANA

Manufacturers of America's Most Complete Line of Quality Cold-Finished Steel Bars

production begins with



Columbus Die-Tool

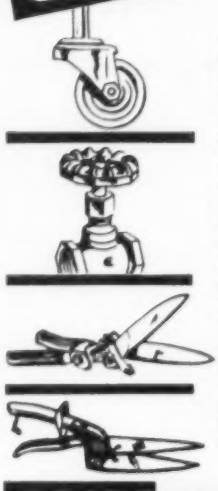
No tools like the right tools! Columbus Die-Tool designs and builds tools, jigs, fixtures and special machinery to meet your most exacting requirements. RESULTS: operating cost that matches your budget; production that matches your schedule; product quality that matches the demands of your market.

Contact Columbus Die-Tool & Machine Co. first—when you have a special machine problem. They are nationally known as expert designers and builders of special machinery and equipment . . . have been for over 50 years.

Columbus Die-Tool
AND MACHINE COMPANY
P. O. BOX 750 • COLUMBUS, OHIO
ESTABLISHED 1906

Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

use this special, thin GRIPCO JAM NUT



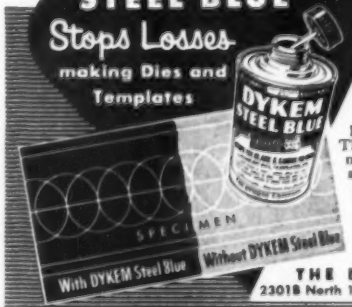
to get a positive lock on bolts subjected to shearing stresses where the strength of a full nut is not required. The thin GRIPCO Jam Nut locks without the use of lock washers or other parts. The nut itself does the WHOLE job—so shorter bolts can be used. Applicable on such products as valve handles, casters, garden and pruning shears, hedge clippers, sickle bars, etc. GRIPCO JAM NUTS are manufactured in the new Unified Finish and Heavy Series (Hexagon). Furnished in standard full and jam dimensions, in steel, brass and aluminum. *Write for samples and full particulars*

GRIPCO PRODUCTS INCLUDE:
Gripco Lock Nuts, New Gripco "Clinch" Nuts, Gripco Hi-Nuts, Gripco Pilot-Projection and Countersunk Weld Nuts with or without Gripco locking feature.

GRIP NUT COMPANY
"after 50 years still holding strong"
102 Broad St., South Whitley, Ind.

RUSSELL
HYDR. SAWING MACHINES
All sizes up to 14" capacity, with and without automatic stock feed
Ask for catalogs
TRIPLEX MACHINE TOOL CORP.
75 West St. New York 6, N. Y.

DYKEM STEEL BLUE
Stops Losses making Dies and Templates

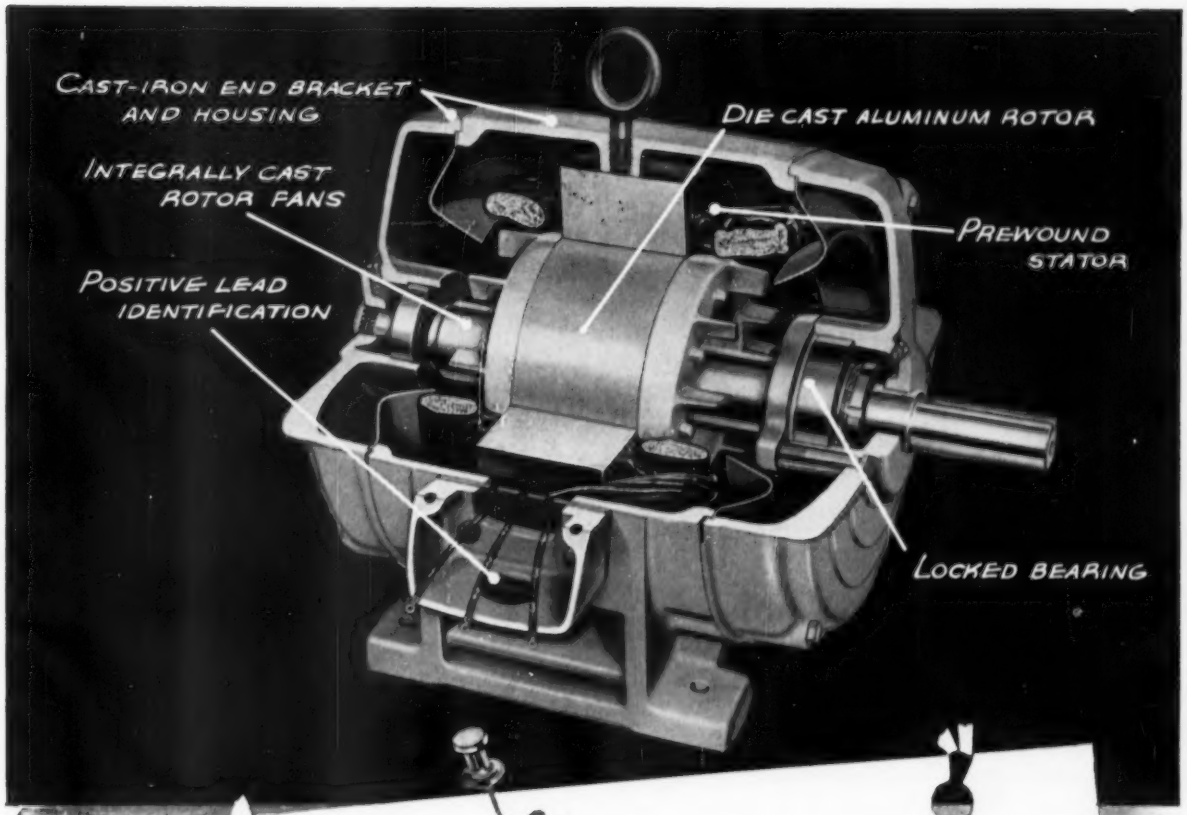


Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301B North 11th St. • St. Louis 6, Mo.

CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.
THE DYKEM CO., 2301B NORTH 11TH ST., ST. LOUIS 6, MO.



Are you getting all these extras in the motors you buy?

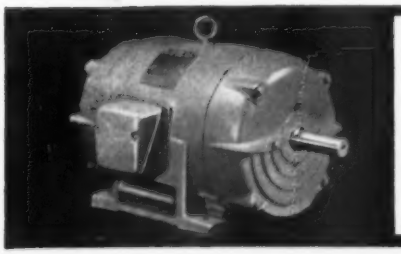
Louis Allis gives them to you, because they build their standard motors with special care

For years, Louis Allis has specialized in special motors for many of industry's toughest drive problems. Such installations call for extreme care in both motor design and manufacture—care that has become a habit with us. That's why we build our standard motors with special care.

What does this mean to you? It means that you get a motor with extra features —a motor that runs better, lasts longer. Here are a few of the extra reasons why:

- New exclusive phenolic impregnating varnish provides high thermal and chemical resistance. It remains resilient and resists aging for longer motor life.
- Locked bearings, inner race to shaft, outer race to end bracket, reduce end play and increase bearing life.
- Increased protection not only for the motor, but also for operating personnel. Double end ventilation permits maximum end bracket enclosure—prevents foreign matter from entering motor.
- Quiet operation obtained by careful design and test. Close manufacturing tolerances assure perfect alignment and minimum electrical noise.

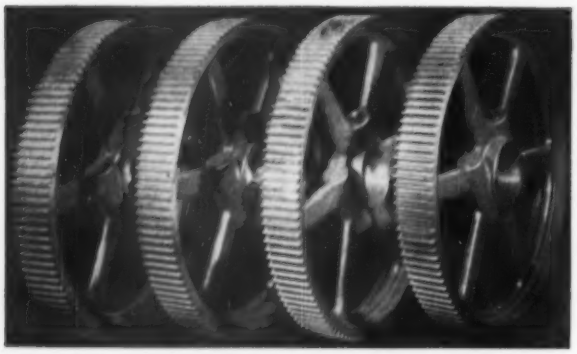
There are many other features such as cast iron construction, positive lead identification, split conduit box—but our new bulletin No. 1700 describes all the many extras you get in a Louis Allis standard motor. Write for your copy.



A complete line of standard rerated motors in frames 182 through 326U now in stock. Special rerated motors are available on short delivery.

LA-108

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN



Cast Iron CLAMP HUB GEARS

Each of these cast iron clamp hub gears for paper mill use weighs 1300 pounds—accurately machined to give long, trouble-free service. Stahl has the experience, skill and production facilities to more than satisfy your most exacting gear needs—any size, any quantity, any material. Send for Stahl's estimate first!

SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 2½" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FIBROIL
HEAT-TREATED, CASE OR FLAME HARDENED GEARS—OF CARBON OR ALLOY STEEL

Stahl

GEAR & MACHINE COMPANY
3901 Hamilton Ave. Cleveland 14, Ohio

VAILL

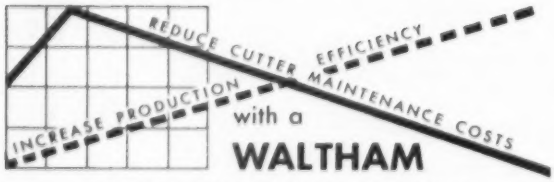
TUBE END-FORMING MACHINES
shape and form tube ends
fast...accurate...at less cost

FREE—New Bulletin T-1 shows, describes VAILL tube end forming machine VERSATILITY for . . .

Beading • Flaring • Flanging • Sinking
Expanding • Grooving • Threading • Reducing
Double Lap Flaring • Double Lap Flanging

on Tubing up to 6"Diam.

THE VAILL ENGINEERING CO.
135 E. MAIN STREET WATERBURY 20, CONN.



CUTTER SHARPENING MACHINE

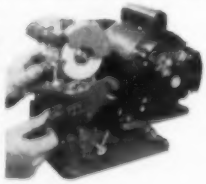
This self-contained machine does not require a skilled operator to grind cutters of small diameter which are sharpened by grinding the face of the tooth.

Check these outstanding WALTHAM qualities:

1. A dulled cutter may be sharpened and returned to service in less than 5 minutes.

2. This machine may be adjusted to grind positive or negative rakes as well as radial, changing quickly and accurately from one to the other.

3. Being portable this efficient machine may be located in the department where cutters are being used, thus cutters may be sharpened and returned to service immediately. Systematic sharpening by the WALTHAM method minimizes the reduction of the cutter diameter. This eliminates costly adjustments necessary to re-establish the basic work dimensions.



4. In two minutes, the cutter, arbor and index may be changed to accommodate cutters having different hole diameters and different numbers of teeth.

Send today for Bulletin No. 352

WALTHAM MACHINE WORKS, INC.
High St., Waltham, Mass.

ALL in ONE TOOLHEAD*

BORING
FACING
TURNING
GROOVING
UNDER CUTTING

SIX SIZES AVAILABLE

ALL HAVE POWER FEED FOR FACING

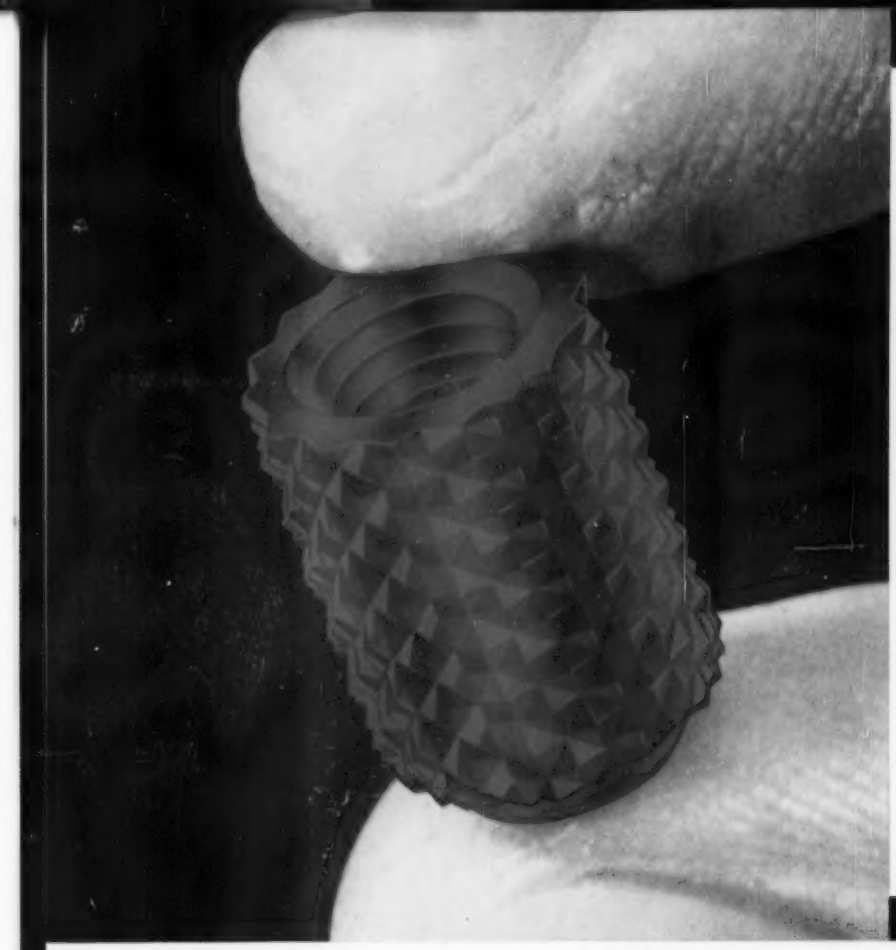
Model "D"

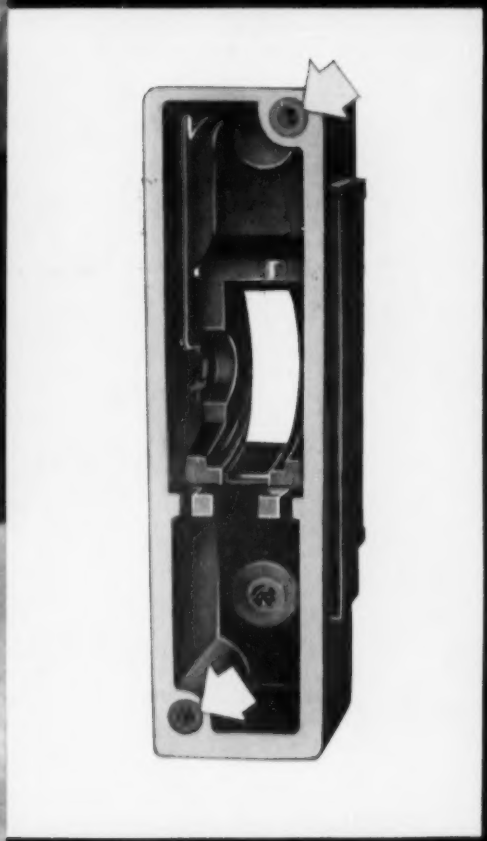
* A BORING HEAD THAT WON'T FACE IS NOT COMPLETE

WRITE for COMPLETE DETAILS

CHANDLER TOOL CO
Muncie, Indiana

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex





Versatile Aluminum . . . Natural Choice for Machined Inserts in Plastic Molded Parts

These little fellows—threaded inserts for molded plastic parts—are produced by the millions at Yardley Precision Products Company, Yardley, Pa. Because of its amazing versatility they fabricate them from 2011-T3 *Reynolds Aluminum screw machine stock.* It helps make inserts better, lowers costs, simplifies molding designs.

Aluminum is strong. It permits ample wall thickness without bulk . . . yet insures sufficient strength to withstand molding pressure without rupturing the insert. And aluminum enables Yardley to produce inserts to precision standards with clean threads and coarse knurls.

Lightweight aluminum does all this while lowering costs. It gives three times as much metal per pound as brass or steel—permits high-speed machining—provides lowest total cost for material and machining.

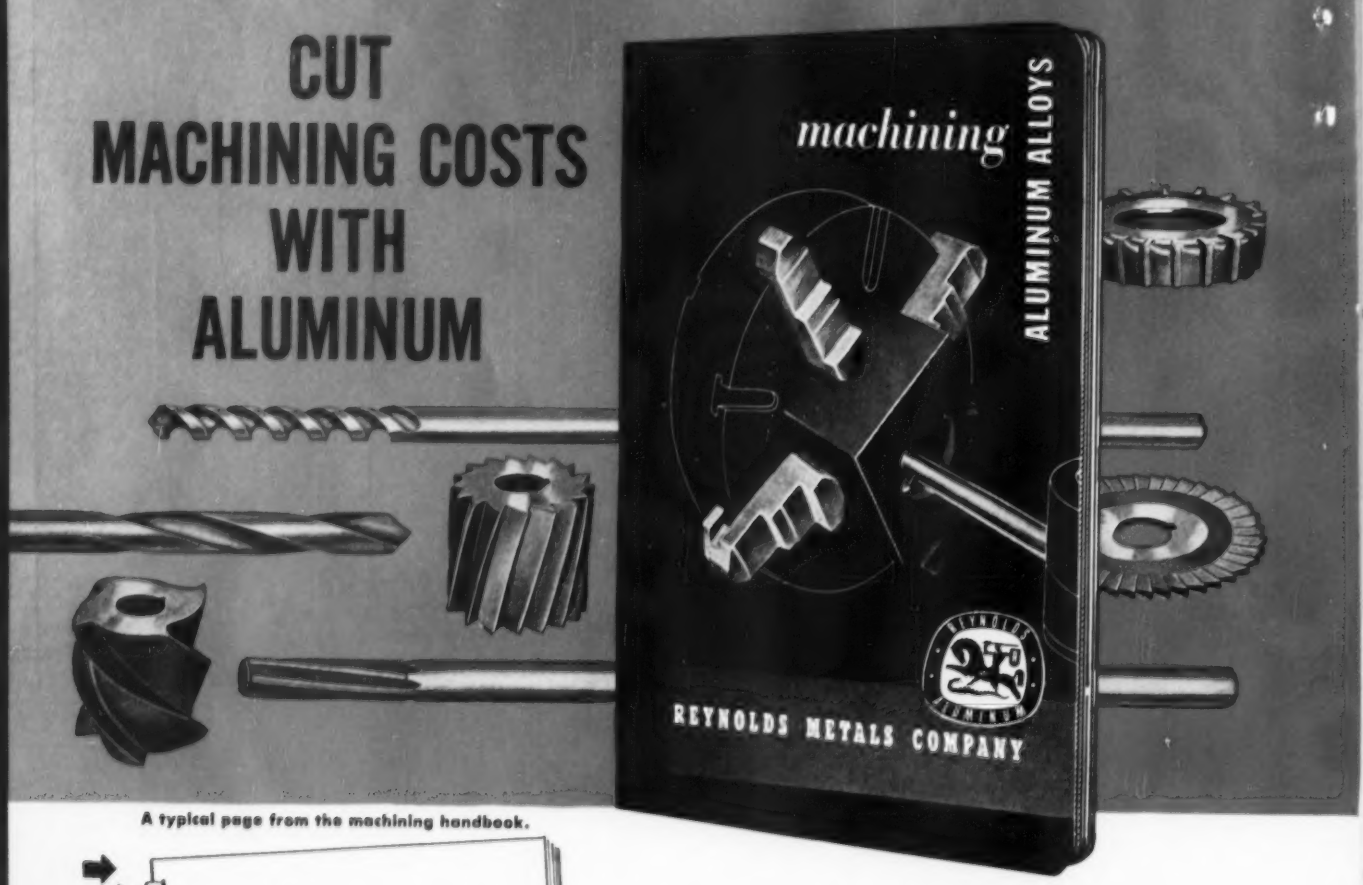
For more information call the nearest Reynolds Office or Distributor listed under "Aluminum" in classified telephone directories. Ask for brochures, "Reynolds Aluminum Screw Machine Stock" and "Aluminum Machining Data, Speeds and Feeds." *Reynolds Metals Company, P.O. Box 1800-JJ, Louisville 1, Kentucky.*

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

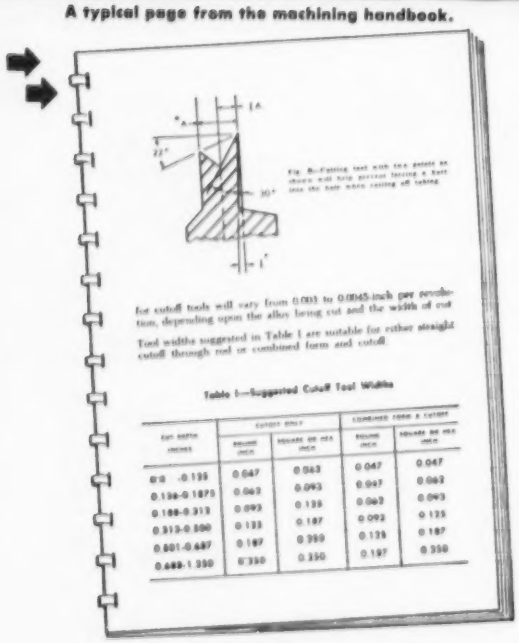
See "FRONTIER", Reynolds exciting dramatic series, Sundays, NBC-TV

FOR MORE INFORMATION SEE NEXT PAGE →

CUT MACHINING COSTS WITH ALUMINUM



A typical page from the machining handbook.



for cutoff tools will vary from 0.003 to 0.0045-inch per revolution, depending upon the alloy being cut and the width of cut.

Tool widths suggested in Table I are suitable for either straight cutoff through rod or combined form and cutoff.

Table I—Suggested Cutoff Tool Widths

CUT DEPTH INCHES	CUTOFF ONLY		COMBINED FORM & CUTOFF	
	ROUND OR HEX INCH	SQUARE OR HEX INCH	ROUND INCH	SQUARE OR HEX INCH
0 to .135	0.047	0.063	0.047	0.047
0.136-0.1875	0.063	0.093	0.047	0.063
0.188-0.313	0.093	0.125	0.063	0.093
0.313-0.500	0.125	0.187	0.093	0.125
0.501-0.687	0.187	0.250	0.125	0.187
0.688-1.250	0.250	0.250	0.187	0.250

THIS HANDBOOK TELLS YOU HOW

The handiest, most helpful handbook you can get on the machining of aluminum alloys is yours for the asking. This book evaluates the various aluminum alloys and recommends machining methods and tools that give maximum production economies. There is a special section on automatic screw machining. Every designer, production engineer, plant manager and machine shop superintendent needs this 124 page "Machining Aluminum Alloys" on his desk. Single copies are available without cost when requested on your letterhead. Or call your nearby Reynolds Distributor. A complete index of technical literature is also available. *Reynolds Metals Company, P. O. Box 1800-JJ, Louisville 1, Kentucky.*

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

See "Frontier", Reynolds exciting dramatic series — Sundays NBC-TV

You can't afford "mistaken identity" on your production line!

It's hard to believe that the wrong metals get into production so often, and even worse, into finished products. Yet the causes of such mistakes are usually very simple.

Errors are made in shipping or metal stocks are mis-identified. Errors occur in processing, too. Accidental mixing of hardened and unhardened parts of similar appearance is common.

No matter how sly their origin, these undetected situations inevitably get out of hand and into cost figures. Tools are damaged; production time is lost. Parts pile up in scrap, or worse, get by inspection and fail in the hands of the customer.

New Brush METAL MONITOR takes the guesswork out of metal identification.

Most plants are surprisingly susceptible to these cases of "mistaken identity" which cost millions of dollars every year. *But now these wastes can be eliminated!*

New Shop Tool Identifies Metals

Brush Electronics offers a new instrument, the Brush METAL MONITOR,* which will detect variations from approved metal specifications at any stage of processing. It works on ferrous or non-ferrous metal, is nondestructive, won't mar finished surfaces. And it's portable, easy to use. Any worker can check any metal anywhere in the shop. The METAL MONITOR prevents losses due to the use of the wrong metals.

How It Works

Metal checks are easy to conduct. The METAL MONITOR probe is held momentarily on a sample of metal known to have the desired structure and composition and the operator obtains an immediate reading. He then holds the probe on the piece to be checked. If the reading is the same, the metal is the same . . . if the reading varies, it's the wrong metal.

Write for this introductory booklet on the new Brush METAL MONITOR now!

To get the complete facts about this fast, accurate instrument, send for your free copy of a brand-new booklet. It describes the Brush METAL MONITOR in detail, explains how it will save money for your company.

*T. M.

BRUSH ELECTRONICS COMPANY

3505 Perkins Avenue, Cleveland 14, Ohio

BRUSH ELECTRONICS

DIVISION OF CLEVITE CORPORATION

So easy to convert to

ONE PIECE INVESTMENT CASTING...

with Production Savings to **50%**

These pieces used in turbine flow meter work formerly fabricated of several components, now cast as an integral unit and used in the final assembly with a minimum of machining. #400 Stainless Steel.

Why? . . . because Investment Casting reduces tooling up . . . cuts down machining . . . conserves metal . . . eliminates assembly steps.

QUALITY CONTROL
Guaranteed work by virtue of complete inspection facilities: X-ray, Zyglo, Heat Treating etc.

Everywhere . . . Design Engineers are making the quick, easy, economical switch from other processes to Investment Casting.

More . . . Investment Cast parts need little finishing . . . thus cutting down on time . . . and Investment Casting Company . . . casts to close tolerances . . . accurate in every detail in the production of parts and components.

INVESTMENT CASTING CO.
60 BROWN AVENUE
SPRINGFIELD, N. J.

Write to dept. E.

On Request—Our brochure and other data to help you with your special casting problems.

NOW AVAILABLE IN DECIMAL SIZES!

Schmarje

CARBIDE STUB SCREW MACHINE REAMERS

FAST DELIVERIES OF THE EXACT SIZE YOU WANT!

Better finish . . . greater accuracy . . . lower tool cost! *Write today for specifications and prices.*

SCHMARJE TOOL COMPANY
Carbide Reamers • Form Tools
MUSCATINE 2, IOWA

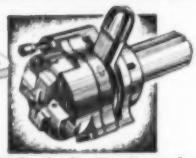
POPE PRECISION SPINDLES for Grinding, Boring, Milling

Belt Driven • Motorized • High Cycle • Special

Let us send you Data Sheets

POPE MACHINERY CORP., 261 River St., Haverhill, Mass.

H&G Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 28-40 Barclay St., New Haven, Conn.
Pacific Coast Rep: *A. C. Berkringer, Inc., 884 N. San Pedro St., Los Angeles, Calif.* Canada: *F. F. Barber Machinery Co., Toronto, Can.*

Abrasive Cent-R-Lap Tool

Saves time, eliminates diamond dressing. Cones changed in seconds. Available in 2 sizes, ⅜" and ¾" Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices.

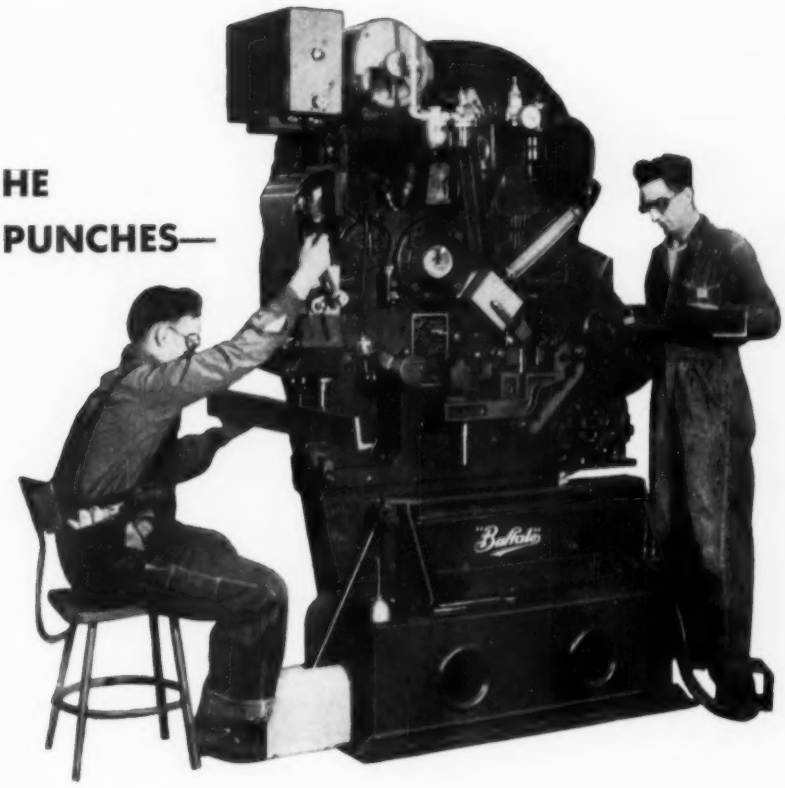
J. R. REICH MANUFACTURING CO.
201 E. Stroop Rd. Dayton 9, Ohio

ACROMARKER NAMEPLATE AND PARTS STAMPING

MACHINES COME IN SEVERAL SIZES AND STYLES. CHARACTERS RANGE FROM 1/16" to ¾". HAND, FOOT AND POWER MODELS.

ACROMARK Company
7-13 MORRELL ST., ELIZABETH 4, N. J.

HE PUNCHES—



—WHILE HE COPES

—JUST A SMALL SAMPLE OF THE USEFULNESS OF THE "BUFFALO" UNIVERSAL IRON WORKER

1. NOTCHES The only machine available with built-in V-notcher—independent of other operations.

2. SHEARS-SLITS Has handy crank-adjusted stripper and broad shelf for adequate support of work.

3. PUNCHES Angles, flats, channels, tees, beams (in flange or web). Floating punch head permits accurate spotting of work.

4. MITERS ANGLES square, 45°, 30° and 15° with quick pin-in-hole setting for angle of cut.

5. CUTS BARS square or round. Stripper always rigidly fixed in position.

6. COPES The only machine available with built-in square coper, independent of other operations.

SIZES TO HANDLE THE WORK YOU DO!

Write for Bulletin 360 for all details on these versatile, quality-built machines to speed up your maintenance and production fabrication.

BUFFALO FORGE COMPANY

Machine Tool Division

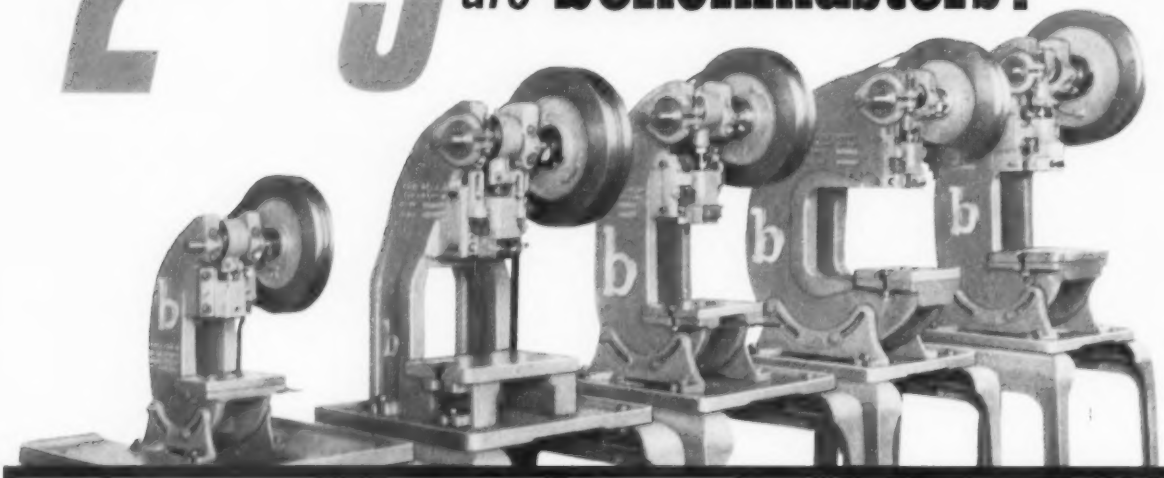
509 BROADWAY **BUFFALO, NEW YORK**

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

2 out of 3 small presses purchased are benchmasters!



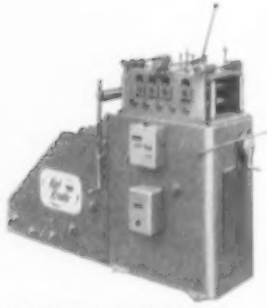
That's a fact . . . out of all small punch presses purchased 2 out of 3 are supplied by Benchmaster!

Being first choice by so wide a margin is no accident. First, Benchmaster builds small presses in 3 *distinct capacity ranges* . . . 2, 5 and 8 tons. Second, consider the various models available . . . *plain inclinable models, backgeared types, deep throat presses, fixed bed gap frame types, half presses, multiple ram presses and special stroke models!*

Add to this the complete range of Benchmaster Accessories . . . AUTOMATIC DIAL INDEX FEEDS, AUTOMATIC FRICTION ROLL FEEDS, ROLL STRAIGHTENERS, KOIL KRADLES, BARRIER TYPE GUARDS, CHUTE TYPE PRODUCTION PANS, ETC. And remember, Benchmaster's acceptance is world-wide—wherever you go there's a Benchmaster—and Benchmaster service!

When buying new presses choose the winner . . . *First in Sales, First in Quality, First in Economy!*

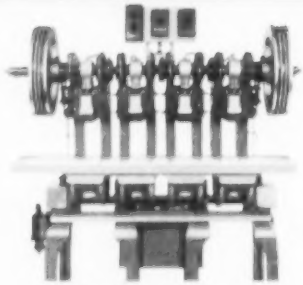
Wherever there's a press operation, this Benchmaster Equipment will cut costs, save time!



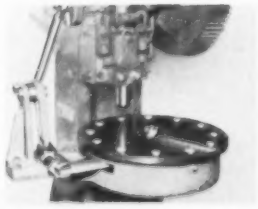
BENCHMASTER STRAIGHTENERS—(Shown in combination with Koil Kradle.) Adjustable, power driven rolls; removes kinks—straightens out coil stock before feeding to feed mechanisms or to press. Many sizes, write for details.

BENCHMASTER KOIL KRADLES—Automatically supplies a slack loop from which any machine can draw. Overcomes inertia of heavy coils—easier loading. Many sizes. Ask for data.

BENCHMASTER AUTOMATIC FRICTION ROLL FEEDS—A low cost roll feed made especially for all small presses. Has automatic roll lifters, feeds almost any material. Two models: 0-3" and 0-6" cutoff, 3, 5, 7 and 9" roll widths.



BENCHMASTER MULTIPLE RAM PRESSES—Any number of units required—rams can operate in unison, can alternate or can be staggered . . . all operate on same crankshaft . . . stroke lengths can also vary on each ram . . . separate die stages on each bed cut tooling costs, permit quick replacements. Costs ½ to ⅓ of large presses doing similar work; doubles production!



BENCHMASTER DIAL INDEX FEEDS—Links with ram, automatically indexes, placing new station under ram with each stroke. Up to 6000 strokes per hour. Cuts labor—makes your press operations almost automatic. 12" or 15" diameter tables, up to 24 stations.

FREE BENCHMASTER CATALOG! Write today!

benchmaster

World's largest manufacturer of small punch presses and mills.

1835 W. Rosecrans Avenue, Gardena, California

TOOL LIFE INCREASED 400%

CLEVELAND Carbide Tipped Adjustable Reamer sets new high record!

The specifications on this job call for reaming a 4½" hole to a tolerance of .001" and a surface finish of less than 50 R.M.S. (micro-finish). CLEVELAND Carbide Tipped Adjustable Reamers are meeting these requirements day after day... month after month... *and reaming five times as many holes per grind as the conventional high speed reamers formerly used.*

◇ Whenever *you* have a difficult reaming problem, a CLEVELAND Service Representative can help you. Contact our nearest Stockroom, or...

TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

Request your copy of this descriptive booklet on CLEVELAND Carbide Tipped and Solid Carbide Cutting Tools

THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58

E. P. Barrus, Ltd., London W. 3, England

When Your Safety Director Fights for Every Dollar, Respect Him—

He Can Save You

Many More in Preventing Accidents Like This!

A rock drill operator in a silver and lead mine lost the sight of one eye when struck by a rock chip dislodged by his drill. A court awarded $2,755. Pity of it is that a quality Chipper's Goggle costing only about $2.30 would have prevented this accident. The mine management would be ahead by $2,753.70 plus medical and other hidden costs — and the miner would still have his eye.

To prevent these *unnecessary* high costs, more and more managements are putting the job of accident prevention in the hands of a specialist — and *backing him up!* He can pay for his salary many, many times over in the accidents he prevents and the quality of the protective equipment he recommends . . . in eye protection, safety clothing or respiratory protection. For instance, when he recommends an AO† Eye Protection Program, he *knows* you'll get a better break on insurance costs, save on idle machine charges, and take no chances on key workers being knocked out and slowing up production. He knows you'll improve workers' morale, also. Ask an AO Safety Representative to call with all the facts.

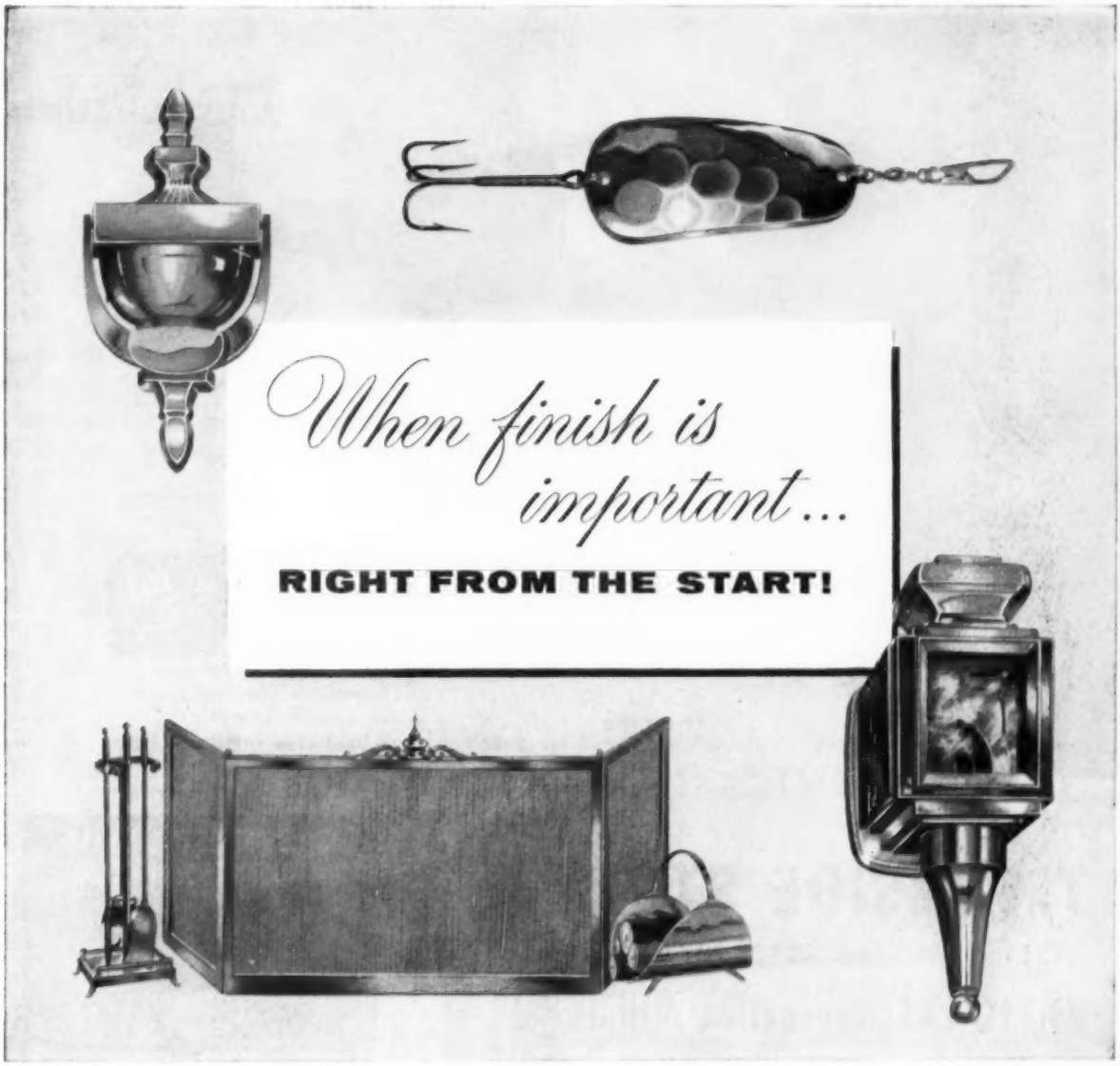
†T.M. Reg. by American Optical Company

Always insist on the AO trademark on safety lenses and frames.

American Optical
SAFETY PRODUCTS DIVISION

One of AO's new F5100 Series metal Safety glasses with "Ultrascopic Vision" Write for illustrated brochure.

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



CHASE® DRY-ROLLED BRASS & COPPER

What an amazing timesaver! Wonderfully smooth Chase Dry-Rolled strip forms as quickly and easily as ordinary quarter or half-hard strip. Yet, parts are so mirror-bright that regular buffing operations can be *slashed*—sometimes even eliminated!

Chase Dry-Rolled brass or copper strip is actually burnished at the mill, by super-smooth rolls. It's a special finishing process that can be applied to many of the Chase alloys you regularly use.

No extra charge for Chase Dry-Rolled strip! That's why it'll pay you to call in a Chase representative to talk over the use of this cost-cutting metal. Call today!

Chase

BRASS & COPPER CO.

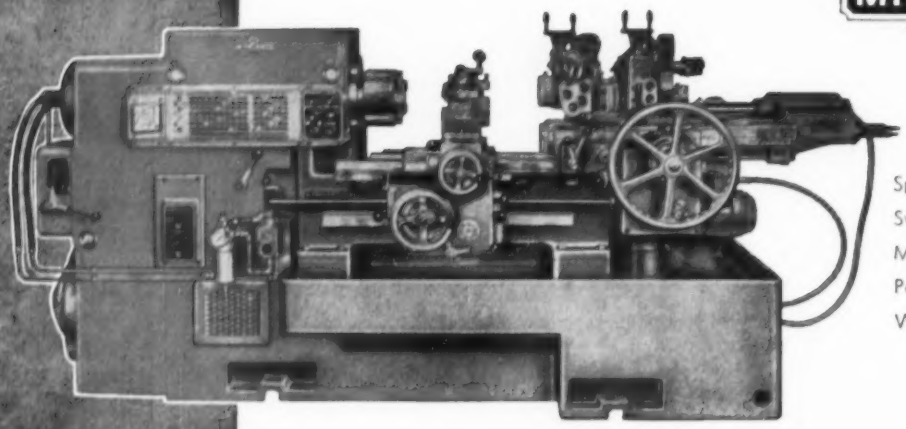
WATERBURY 20, CONNECTICUT
SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

50/E

AUTOMATIC
"CAMLESS"
TURRET LATHE



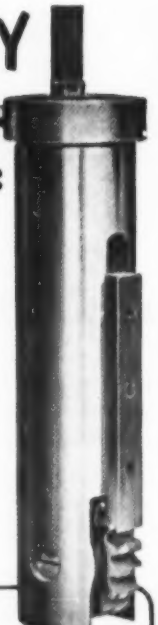
MINGANTI
BOLOGNA

Spindle bore	2 1/4"
Swing	18"
Max speed	rpm 3000
Power	HP 8
Weight	lbs. 6000

GIUSEPPE MINGANTI & C.
BOLOGNA (Italy)

Exclusive Distributors for the U.S.A.: Sales Service Parts
The Melborn Company, 18015 Reed Ave., Melvindale, Mich., U.S.A.

The INSIDE STORY about NATIONAL Keyseating Millers



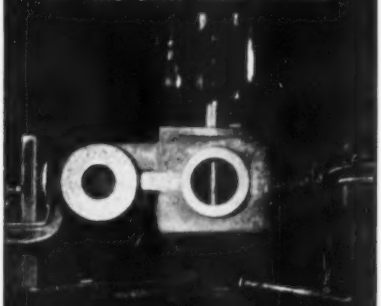
NATIONAL Keyseating Millers are designed for milling internal keyseats . . . in one cut . . . in offset holes . . . with parallel sides . . . partly through holes . . . of standard width and depth . . . in holes that are closed at one end . . . and many other operations that a keyseating machine can't reach. A demountable guide on body of Miller enters keyseat being milled assuring straight keyseat in perfect alignment with the axis of the bore, thus making it unnecessary to clamp work to drill press table.

CUTTERS are made from high speed Rockwell hardened steel, accurately ground to size. Tops of teeth are staggered to break chips which reduces strain and wear on both cutter and driving pins. It will pay you to put National Keyseating Millers on the inside of your next keyseating job.

national
MACHINE TOOL CO.
CINCINNATI 22, OHIO

WRITE TODAY
for Catalog No. 17
complete, handy size

33% DECREASE IN DIE WEAR ON THIS GRAY IRON FITTING



...thanks to
FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged *89.5%* greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE . . . because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 15, Niagara Falls, N.Y. 66-00

CARBORUNDUM®

Gaging . . .

the Surplus Machinery Market

A new kind of insurance on used machinery has West Coast dealers buzzing. Although Lloyds of London has been writing used machinery insurance for many years, American firms are just starting to write it. In this country it got its start in California early this year, has spread to about half a dozen Western states.

Here's a concrete example of how the insurance works: a Bakersfield, Calif, machine shop owner has a machine tool worth $10,000 that he wants to insure, but if anything happens to it (under usual extended coverage terms) he'd like to get a new machine of the same type—cost $12,000.

OK says the insurance company, we'll underwrite it for you, BUT you'll have to pay two premiums instead of one: first, you pay $24.20 a year for coverage on the machine's actual value ($10,000). Then, on top of that, you must pay a premium at the same rate for the difference between your machine's value and that of a new one, bringing the total to $29.04. And it is necessary that you insure a machine tool for at least 90% of its replacement value.

Naturally, insurance firms are pretty choosy about who can get this type of insurance—they know temptation might be great for some insured owner to set a torch to his shop in order to replace his old equipment with spanking new machines.

West Coast insurance people say this is the coming thing. Within a few years, they predict, this type of insurance will become as common as replacement cost insurance on buildings.

Oddly enough, it's hard to find an insurance company that will admit it carries tool replacement insurance, yet we have it on good authority that at least a dozen California companies do so. It seems they're not set up to go into it on a really big scale until some bugs are ironed out.

For one thing, it's a tough job for them to figure depreciation on metalworking equipment, especially since such equipment isn't appraised as frequently as are buildings, and a loss could come when there hadn't been an appraisal for some time.

Actually, replacement cost insurance is a simplified form of depreciation insurance, which has been offered for more than five years in the East as well as the West.

Incidentally, they'd rather insure corporations than partnerships. Insurance men feel there's less moral hazard with corporations because heads of the firm wouldn't stand to benefit directly from a loss as partners would.

Replacement insurance could mean a big shot in the arm for the used machinery business. While it won't mean more sales of 10-years-and-more-old machines (the insurance people won't touch anything that old), it could be an effective sales tool for late and middle-aged model tools by answering buyers' time-honored complaints that middle-aged equipment can't be insured adequately.

United
EVERY TIME!

AUTOMATICS
B & S 00G Hi-Speed—Vertical Slide
B & S 00G Screw Threader—1950
1" Greenlee 6-Spindle—1940

BORING MILLS
2½" GIDDINGS & LEWIS #25RT—Table Type, Hor.
KING 72" Vert.—2 Rail—Side Head

GEAR EQUIPMENT
FELLOWS 12" Helical & Spur Gear Shaver
FELLOWS 8M Red Liner Gear Checker
PEERLESS Gear Chamfering & Deburring

GRINDERS
B & S #2 14" x 30" Univ.
CINN. #2 Filmatic Centerless
LANDIS 10" x 96" Type C Hyd. Plain
THOMPSON 12" x 16" x 60" Hyd. Surface Grinder

ENGINE LATHES
MONARCH 14 x 30 Model C Toolroom —T.A.
P & W 14" x 30" Model C—T.A.
SEBASTIAN 16"x36" Model R—T.A.

MILLERS
B & S 2B Hi-Speed, Plain
B & S 3B Hi-Speed, Plain
K & T 2H Plain
K & T 5H Plain
CINCINNATI #0/8 Plain Production
CINCINNATI #0/8 Vertical
CINCINNATI #4-36 Hydromatic—2-way cycle
CINCINNATI #2-18 R & F Production—Cam Roller
K & T #1404 48" Feed Simplex Production
KEMPSMITH #3 Maximiller—1946
INGERSOLL 42" x 42" x 14' Double Housing Adjustable Rail Planer Type Milling Machine, 4 Heads
P & W 6 x 60 Model C Thread Miller
SUNDSTRAND 00-8 Hyd. Rigidmill Chasing Attachment

TURRET LATHES
B & O #7 2½"—Chucking—Thread Cutting Attachment
GISHOLT 1L 3"—Chucker—Cross Sliding Turret
W & S Model 1A Heavy Duty—2½"—Bar Feed

MISCELLANEOUS
CANEDY-OTTO 4'1" Radial Drill
GORTON 8½D Duplicator
GRAY 36" x 36" x 12' Double Housing Planer—Pendant Control—Auto. Tool Lifters
H. E. B. #0P320 Hyd. Copying Lathe 1952
HEALD #47A Borematic, Hyd. Cross Table
MOREY 12" Vertical Shaper
NILSON #50 4-Slide, Wire Former 1947
P & W #M-30 Single Spindle Profiler
SIP #2C Jig Borer

United
MACHINERY & TOOL CORPORATION
83 THOMAS STREET
WORCESTER 8, MASS.

Quality . MOREY . Value

RELIABLE MACHINE TOOLS FOR HALF A CENTURY

BORING MILLS — Horizontal JIG BORERS

DEFIANCE Model 25-A Boring Mill 3½" bar; late type
GIDDINGS & LEWIS No. 346-T Boring Mill; late type
HEALD No. 46R single end, single spindle Bore-Matic; late type
HEALD No. 48-A Single End Precision; double spindle; late type
HEALD #49 double end four spindle Bore-Matic; late type
LANDIS No. 35, 3½" Floor Type, M.D.
LUCAS No. 42 "Precision" Boring, Milling & Drilling; late type

BORING MILLS — Vertical

BULLARD 8", 6-spindle Type "D" Mult-au-Matic; late type
BULLARD 16" 6-spindle type "D" Mult-au-Matic; late type
BULLARD 24", Vertical Turret spiral drive; late
BULLARD 36" Vertical Turret spiral drive; late
BULLARD 36" high speed 18" extra high column; spiral drive; late type
BULLARD 30"x20" Man-au-Trol Tables; late
CINCINNATI 42" Heavy Duty; late type

BROACHES

CINCINNATI I-30 Duplex Vertical, cap. 2,000 lbs. 30" stroke, Hydraulic; late
COLONIAL VGT-10-48 Vertical, cap. 20,000 lbs.; 48" stroke, Hydraulic; late
LaPOINTE 3-L Horizontal; late type
LaPOINTE 10-54" Vertical, Model SRV, cap. 20,000 lbs.; 54" stroke; new 1947
LaPOINTE 15-66" Vertical; model SRV; cap. 30,000#; 66" stroke; New 1947
OILGEAR 3XA Horizontal, cap. 20,000 lbs.; 56" stroke, Hydraulic; M.D.
OILGEAR XL-8 Horizontal; cap. 3-tons; 36" stroke; late type

GEAR EQUIPMENT (MISCELLANEOUS)

BARBER COLMAN Type "A" with differential; late type
BARBER COLMAN Type "B" Hobber; late
BARBER COLMAN No. 3 Precision type and Standard type Gear Hobber; late
BARBER COLMAN Model "T" Gear Hobber; late type
BARBER COLMAN #12 Gear Hobber; M.D.
BILGRAM 6" and 16" Bevel Generator; M.D.
BROWN & SHARPE #14 Auto. Gear Cutter; M.D.
BROWN & SHARPE #14 Auto. Gear Cutter; M.D.
CINCIN. No. 4 (36"x12") Gear Cutter; M.D.
CINCIN. No. 6-A (72"x20") Gear Cutter
CINCIN. No. 7-A (84"x24") Gear Cutter
CROSS No. 1 Gear Tooth Rounder; M.D.
CROSS No. 40 Gear Tooth Rounder; M.D.
CROSS No. 45 Gear Tooth Rounder; late
DETROIT type GG 35 Gear Grinder; 18" cap.; late type
GOULD & EBERHARDT type 8H Universal Mfg. Gear Hobber; late type
GOULD & EBERHARDT type 12H Universal Mfg. Gear Hobber; late type
GOULD & EBERHARDT 18H Gear Hobber
GOULD & EBERHARDT No. 24H Universal Gear Hobber; late
GOULD & EBERHARDT No. 36BT 4 spindle Bevel Gear Roughor; motor drive
KOEPFER Model WM-11 Auto. Gear Hobber; late type
PARKSON 9" Gear Tootor; late type
PFAUTER 80 Univ. Gear Hobber; late type
PRATT & WHITNEY 10" Gear Grinder; Single or Double Wheel; late type
ROBEY SMITH No. 1 Bevel Gear Planing
SHEFFIELD No. 201-A Contour Burring Machine; M.D.; late type

LATHES—Engine and Mfg.

BLOUNT B-2 Pedestal Polishing Lathe; late
BLOUNT Double End Polishing Machine
BLOUNT 20"x80" model B3 Polishing Lathe; late
BLOUNT 12"x8' Polishing Lathe
BRIDGEFORD 42"x50' Geared Head; late
CINCINNATI 15"x42" centers "Tray-Top" geared head; New 1954
DENHAM 15/36"x48" Gap Lathe; late type
GISHOLT No. 12 Hydraulic Automatic; late
HENDEY 12"x30" Toolroom; late type
HENDEY 14"x102" Toolroom; late type
HENDEY 14"x30" Engine Lathe; late type
HENDEY 16"x78" Yoke Head; late type
HENDEY 18"x48' Geared Head; late type
HENDEY 16/24"x30" centers; Timken; late
HENDEY 24"x36" centers, M.D.; late type
JONES & LAMSON "Fay" 20"x25" Auto.
LEBLOND 16"x36" centers Auto.; Timken
LeBLOND Model 7ACL Crankshaft; 9"x30"
LeBLOND 20"x48" centers; H.D. Timken; late
LeBLOND 27"x144" centers; motor drive
LeBLOND 42"x26' Boring Lathe; late type
LIPE "Carbo" 12"x18" Production; late type
LODGE & SHIPLEY No. 6, 24"x96" centers; DUOMATIC; Timken; late
LODGE & SHIPLEY 12"x30" Toolroom; late
LODGE & SHIPLEY 14"x30" Toolroom; late
LODGE & SHIPLEY 18"x54" Timken; latest
LODGE & SHIPLEY No. 5x24" Centers Automatic
LODGE & SHIPLEY 22"x60"; Timken; late
LODGE & SHIPLEY 22"x72"; Timken; late
LODGE & SHIPLEY 22"x96" Model X; late
LODGE & SHIPLEY 24"x54"; Timken; latest
LoSWING 4"x60" centers, late type
LoSWING 4"x48" centers, late
LoSWING 8"x108" centers, late type
MONARCH 12"x30" Model CK; Timken
MONARCH 12"x54" Model CK Toolroom
MONARCH 14"x42" Magnamatic; late type
MONARCH 14"x54" Model C Toolroom
MONARCH 16"x30" Model CY Timken; late
MONARCH 16"x54" Model CY, Toolroom; late type
MONARCH 18"x48" Model CBB; late type
MONARCH 18"x48" "CBB" (raises to 26½") Timken; late
MONARCH 18"x72" "CBB" (raises to 26")
"KELLER" copying attachment; late
MONARCH 18"x264" Model M; late type
MONARCH 22"x336" e.c. Model M; late type
MONARCH 25"x48" Model "N," air tracer; late
MONARCH 36"x84" Model NN; late
NEW BRITAIN No. 656 Auto. Chucker; late type
NEW HAVEN 42"x120" centers geared
NILES 30"x25" bed, Single End Boring, "Time Saver"; late type
NILES 30"x46" bed, Single End Boring, "Time Saver"; late type
NILES 42"x216" centers Geared Head; 2 Carriages; late
NILES 120"x96" extra heavy duty
PORTER-McLEOD 16"x6' Lathe; New
PRATT & WHITNEY 16"x30" Timken; late
SPRINGFIELD 14"x43" geared; M.D.; late
SUNDSTRAND 12"x22" Automatic; late

CASH • CREDIT • RENTAL • TRADE-IN

PRESSES

BESCO Model M18; OBI; cap. 10 tons; new
BESCO Model EB2, 18½-ton Back Flywheel New
BIRDSBORO 325-ton, 31"x31" bet. uprights
BLISS No. 410A, 525-ton double action toggle drawing press; M.D.
NATIONAL No. 5 "Maxi-Press" 1,000 ton cap., H.S. Forging Machine; M.D.
NIAGARA No. 66E, 35-ton Press; late
V & O No. 3 30-ton O.B.I. Press; late
WATERBURY FARREL No. 9, 125-ton cap. Blanking Press; M.D.

SCREW MACHINES—AUTOMATIC

ACME-GRIDLEY 2" RB 6-spindle Automatic Screw Machine; New 1953
BROWN & SHARPE model 00G; late
CLEVELAND 3/8" Model A Single Spindle
CLEVELAND 1½" Model A 4-Spindle; late type
CONOMATIC 1⅛", 8-spindle; late type
CONOMATIC 4½", 4-spindle; late type
GREENLEE 1⅝", 6-spindle; late type
GYROMATIC Model 40, 1" 6-spindle; late
NEW BRITAIN #656 Automatic Chucking Machine; late type

SHAPERS and SLOTTERS

CINCINNATI 24" Horiz. P.R.T.; late type
GOULD & EBERHARDT 32", motor drive
HENDEY 12" Universal "High Speed"; late
MOREY 8" Vertical Shaper; late type
NEWTON 15" Vertical Shaper; late type
PRATT & WHITNEY 6" Vertical; Model B; late type
PRATT & WHITNEY 10" Vertical; M.D.
ROCKFORD 20" Hydraulic Shaper; late
ROCKFORD 36" Hydraulic Shaper; late

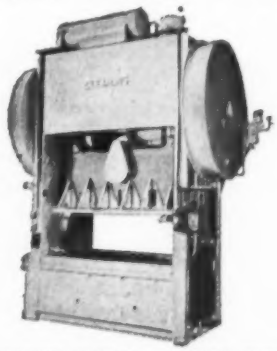
PARTIAL LIST. Ask for catalog!
FREE PARKING for CUSTOMERS on PREMISES

MOREY MACHINERY CO. Inc.

MANUFACTURERS • MERCHANTS • DISTRIBUTORS OF MACHINE TOOLS
387 LAFAYETTE STREET — NEW YORK 3, N.Y.
TELEPHONE—ALGONQUIN 4-6560 — CABLE-WOODWORK N.Y.

WORLD'S LARGEST STOCK
STAMPING PRESSES

BLISS • CLEARING • CLEVELAND
FERRACUTE • HAMILTON • L & J
NIAGARA • TOLEDO • V & O



SQUARING SHEARS • PRESS BRAKES
REBUILT *and* GUARANTEED

JOSEPH HYMAN & SONS
TIOGA, LIVINGSTON & ALMOND STS.
PHILADELPHIA 34, PA. *Phone* GArfield 3-8700

SAMSON
BUYS SELLS

STANDARD OR SPECIAL MACHINERY AND EQUIPMENT
FUNDS AVAILABLE
FOR PURCHASE OF SINGLE MACHINES OR COMPLETE PLANTS

SAMSON MACHINERY CO.
9A South Clinton St., Chicago 6, Ill.
Room 628A Phone CENTRAL 6-3229

BENNETT MACHINERY CO.

GUARANTEED MACHINE TOOLS

BORING MILLS 4½" bar Sellers, Floor Type
52" King & 84" Sellers
4" & 3½" Bar Landis, Floor Type (2)
3" Bar Universal Tble. Type, Triway
GRINDERS, 60" Hanchett Vert. Spin., No. 306 Hyd., Surf.
Nos. 2B Reid, 3B Abrasive, Surf.
36"x42" Pratt & Whitney Die & Surf.
36"x120" Hanchett Plano, Surf.
16"x96" Cinc. Plain Cyl.
LATHES, 25"x192" Gen. Lehmann, T.A.
18"x48" cen. Monarch, '42
20"x54" cen. Reed Prentice '43
TURRETS No. 2H10 Libby 10⅝", '43
Nos. 5 & 5 B. & O. '43
No. 3 Gisholt, Bar Chuck, '42
ROLLS, 10'x¾" Bertsch Pinch '43
SHAPER, VERT., 12" Pratt & Whitney, 1942
SLOTTER, 36" Rockford, Hyd., '44

375 Allwood Rd., Clifton, New Jersey
Phone: PRescott 9-8996 — N. Y. Phone: LOngacre 3-1222

Indianapolis
MACHINERY & SUPPLY CO.
1983 South Meridian Street
Indianapolis 6, Indiana

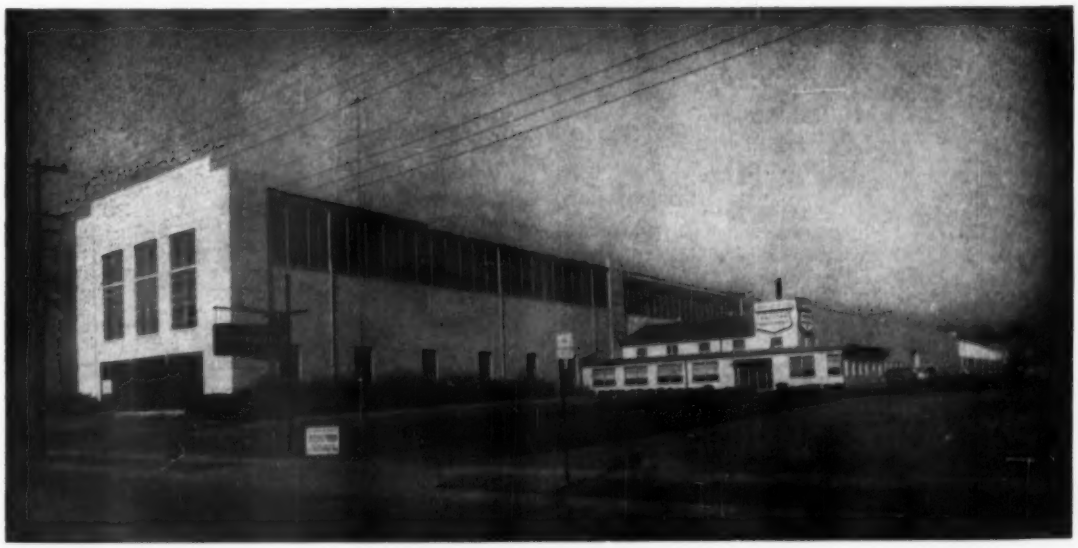
- SBD 72-30 American Duplex Vertical Broach 30-ton 72" stroke. 1943.
- 36" x 240" Centers Niles Timesaver Engine Lathe. New in 1941.

Write for Complete Stock List

LATE TYPE MACHINE TOOLS

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY — THE MARK OF DEPENDABILITY



UPRIGHT DRILLS

20" Cincinnati-Bickford Super-Service Prod. Drill, m.d.
24" Aurora, m.d.
24" Cincinnati-Bickford, m.d.
No. 2 Colburn Mfg. Type, m.d.
No. 4—48" Defiance Machine Co. Drill, m.d.
No. 201½ Barnes Single Sp. Self-Oiling All Geared Drill & Tapper, 1943
No. 242 Barnes Single Sp. Self-Oiling All Geared Drill & Tapper
No. 417 Baker, m.d.
No. 513 Baker, m.d.

GEAR SHAPERS

No. 4 Fellows Enveloping Gear Generator, m.d.
No. 12 Fellows Gear Shaving Machine, m.d., late
No. 6 Fellows, belt drive
No. 7, 7A Fellows Gear Shapers, belted m.d.
No. 18 Fellows Gear Finishing Machine, m.d.
No. 51 Fellows, belted motor drive
No. 61 Fellows, gear box, m.d.
No. 61A Fellows, m.d., latest type
No. 64S Fellows, m.d.
No. 645A Fellows, m.d.
No. 645A3 Fellows, vee belt drive
No. 72 Fellows High Speed Spur Gear Shaper, m.d.
No. 75 Fellows High Speed, m.d.
No. 75A Fellows, H.S. Spur & Helical Gear Shaper, m.d.
No. 712 Fellows, m.d.

GEAR CUTTERS

No. 12 Gleason Straight Tooth Bevel Gear Rougher, m.d.
No. 36 Gould & Eberhardt Bevel & Spur Gear Rougher, m.d.
Gleason Spiral Bevel Gear Rougher, m.d.
No. 36M Gould & Eberhardt Spur Gear Cutter
No. 4B Fellows Gear Burnisher
No. 8B Fellows Gear Burnisher
Cincinnati Gear Burnisher, m.d.
3" Gleason Gear Generator, m.d.
8" Gleason Gear Generator, m.d.
11" Gleason Gear Generator, m.d.
No. 4—48" Brown & Sharpe Spur Gear Cutter, belt
No. 4—48" Brown & Sharpe, m.d.
No. 13 Brown & Sharpe Auto. Spur & Bevel, m.d.

GEAR GRINDING MACHINES

6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d.
No. 13LS Fellows Gear Lapper, m.d.
SG11 Gear Grinding Machine, m.d., latest
GG19 Gear Grinding Machine, m.d., latest
GG31 Gear Grinding Machine, Internal Gear & Spline Grinder, m.d.
15" National Broach Red Ring Gear Lapper, m.d.
10" Pratt & Whitney Model M1639 Single Wheel Gear Grinder Machine, m.d.
18" National Broach Red Ring Gear Lapper, m.d., late

GEAR HOBBING MACHINES

Type A Barber-Colman, m.d.
No. 5AC Lees-Bradner Heavy Type Gear Generator, m.d.
No. 12 Barber-Colman, Double Overarm, m.d.
No. 12 Barber-Colman, Single Overarm, m.d.
No. 34 Brown & Sharpe, m.d., Spur & Spiral
No. 130 Cleveland Rigid Hobber
No. 48H Gould & Eberhardt Spur & Helical, m.d.
No. 44 Brown & Sharpe Spur & Spiral, m.d.

GEAR TESTERS

12" National Broach & Machine Co.
18" National Broach & Machine Co.
19" Gleason Bevel Gear Tester, m.d.
No. 471 Michigan Tool Co. Hob, Reamer & Gear Checker

AUTOMOTIVE GRINDERS

No. 76 Van Norman Automatic Piston Turning & Grinding Machine, m.d.
Kwik-Way Model H Piston Turning & Grinding Machine, m.d.

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. ⅜" Valve Seat, m.d.

CARBIDE GRINDERS

14" Hammond Double End Carbide Tool Grinder
#44 Excello Double End
#48 Excello Carboloy 2 wheel Grinder, m.d.
#49 Excello H.D. Carbide Grinder, m.d.

CRANKSHAFT GRINDERS

18x66" Landis Universal Type C, m.d., late
22"x72" Landis Type CH, m.d., late

CYLINDER GRINDERS

No. 73 Heald Airplane Cylinder Grinder, m.d., new
Model FG Micro Cylinder, m.d.
No. 50 Heald, m.d., 1944

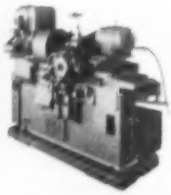
KEYSEATERS

No. 3 Niles Cotter & Keyseat Milling Machine, m.d.

SEND FOR COMPLETE STOCK LIST

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1741
CABLE ADDRESS
EMCO

LAURENS • LAURENS • LAURENS • LAURENS

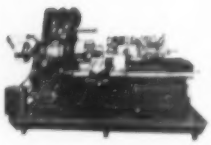


No. 72-A-3
HEALD

Sizematic Hydraulic Semi-Automatic Precision Internal Grinder.

LAURENS • LAURENS • LAURENS • LAURENS

No. 5-D POTTER & JOHNSTON



"Power-Flex" Turret Type Chucking Machine, late style, some tooling.

LAURENS • LAURENS • LAURENS • LAURENS

LANDIS Model HIW Hydraulic Plunge Grinder,

set up for plunge grinding with four wheels. Can be used with up to nine wheels 16" x 40" capacity.

LAURENS

LAURENS is known for late model machines and for high quality. While we have a very large stock, we show here only a few tools which are representative of what we have.

Please send us your inquiries whenever you think that the dealer's technical knowledge is helpful. We have shipped machines to every part of the world. Our prices are always reasonable.

Our customers like our way of dealing—so will you.

Machine Tools
LAURENS BROS., INC.
2780 HIGHLAND AVE.
CINCINNATI 12, O.

LAURENS • LAURENS • LAURENS • LAURENS

Boremetic.
No. 48A HEALD Single End

No. 46B
HEALD Single
End Boremetic.

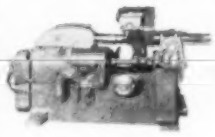
LAURENS • LAURENS • LAURENS • LAURENS

No. 343 SHEFFIELD

Gear & Spline Chamfering machines, new 1950, with #30012 work heads.

LAURENS • LAURENS • LAURENS • LAURENS

Model 24-L-26 BRYANT



Hydraulic Chucking Type Internal Grinder.

SEARCHLIGHT Equipment Spotting SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the Searchlight pages. A 5-minute study may locate the equipment now.

Second, send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

SEARCHLIGHT EQUIPMENT SPOTTING SERVICE, c/o American Machinist, P. O. Box 12, N. Y. 36, N. Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them. NO CHARGE • NO OBLIGATION

Please help us locate the following equipment:

NAME ..... TITLE ..... COMPANY .....

STREET ..... CITY ..... ZONE ..... STATE .....

8/27/56

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented

LATHES

24" x 12' BOYE & EMMES Grd. Head, Timken Bearing, Taper Attachment.

4 DE POTTER & JOHNSTON Automatic Turret Lathe. Late Type.

27" x 18' MONARCH "N" Geared Head Lathe, 11' Centers, Taper Attachment, Full Equipment. Late Type. 1942.

24" x 36" BULLARD Vertical Turret Lathe, Turret Hd., Side Hd., M.D.

No. 2, 4, 6 WARNER & SWASEY Univ. Turret Lathes, Bar Feed.

No. 7 BARDONS & OLIVER Universal Turret Lathes, Preselector, Bar & Chucking. Late Type.

DRILLING MACHINES

36" CINCINNATI BICKFORD Upright Drill Press, P.F., M.D.

3', 4', 5', 6' CINCINNATI BICKFORD Radial Drills.

6 Spindle No. 2 LMS Leland-Gifford Drill Press. Late Type.

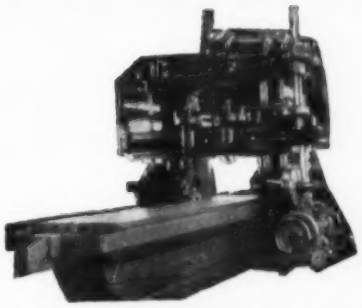
No. 2 M. T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive. Late Type.

MILLS

#2B KEARNEY & TRECKER Univ. Horizontal Vertical Head. M. D.

No. 2 BROWN & SHARPE Vert. Mill, Light Type, Swivel Head, M.D. Late.

1A PRATT & WHITNEY Jig Borer, with Gauges, Rods, Collets and Chuck.



42" by 36" x 12" INGERSOLL Planer Type Mill, two heads on rail, two side heads, M.D.

No. 2B BROWN & SHARPE Horizontal Mill, Motor in Base. Late Type.

PRESSES

No. 6 BLISS Straight Side Press Double Crank 135 Tons Cap., Motor Driven.

No. 8 BLISS CONSOLIDATED 90 Ton Cap., O.B.I. Geared. Air Cushion, M.D.

400 Tons CHAMBERSBURG Hydraulic Wheel Press, 14" Ram, 96" between Tie Bars, 12' to End Support, M.D.

GRINDERS

No. 2 CINCINNATI Universal Tool & Cutter Grinder, Motor Driven.

4" x 12" LANDIS Hydraulic Plain Cylindrical Grinder, M.D. Late Type.

6" x 18" NORTON Hydraulic Horizontal Surface Grinder, Permanent Magnetic Chuck, Coolant System, Late Type.

No. 14 W HAMMOND Double End Carbide Grinder, M.D.

6" x 10" x 48" NORTON Hyd. Horiz. Surf. Grinder, M.D.

4T SELLERS Tool Grinder, M.D. Late Type.

30" INGERSOLL Face Mill Cutter Grinder, M.D. Late Type

6" x 18" LANDIS Type "C" M.D. Hyd., Cylindrical Grinder, Serial #29196

No. 208 BESLEY Motor Driven Disc Grinder, 24" Wheels. Late Type

MISCELLANEOUS

18 KW SCIENTIFIC ELECTRIC Induction Heater, Tube Type.

6' x 14 ga. WYSONG & MILES Shear

No. 8LS FELLOWS M.D. Gear Lapping Machine, Detachable Head, Univ. Work Support.

No. 1, 2, BUFFALO FORGE Vertical Angle Bending Rolls, M.D.

1/2, 1 1/2 BUFFALO FORGE Universal Ironworker, Notcher and Coper, M.D.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, M.D. Late Type.

No. 6 BROWN & SHARPE Automatic Screw Machine, M.D., 2" Capacity.

10' x 1/4" WYSONG & MILES Power Squaring Shears, Motor Driven.

No. 194 BARNES Vertical Hone, 4" Capacity, 12" Stroke, M.D.

12" PRATT & WHITNEY Vertical Shaper, Keller Attachment. Late Type.

12" ROCKFORD Hydraulic Vertical Shaper. 1953.

15' x 10' x 36' BETTS Double Housing Planer, 4 Swivel Heads, Pendant Control, Box Table, Motor Driven.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK . . . SEND US YOUR INQUIRIES

EXCELLENT USED MACHINE TOOLS

No. 2 Standard Brown & Sharpe vertical mill, new 1943.

No. 2 Cincinnati High-Speed dial type plain horizontal mill, new 1941.

No. 3 Gisholt ram type universal turret lathes (2), new 1942.

No. 5 Gisholt ram type universal turret lathe, new 1940.

Models BL2416-BL3616-BL3620 P & W Keller machines (5)-(two late)

14" x 42" cc Hendey toolroom engine lathe, new 1940.

No. 2-20 Kent-Owens simplex mill, new 1948.

No. 4 Cincinnati high-power plain horizontal mill, serial E506J.

No. 4 Gallmeyer & Livingstone universal tool & cutter grinder, new 1941.

5' arm 13" col. Fosdick "Economax" hydraulic radial drill, new 1943.

Free Illustrated Catalog of 1000 Machine Tools

MILES MACHINERY COMPANY
2039 E. GENESEE AVE.
SAGINAW, MICHIGAN
Telephone 2-3105

2000 NEW TOTE PANS

20" x 10" x 6"

Write for sample

A. D. HARRIS
500 40th St., Rock Island, Ill.

HILL-CLARKE ANNOUNCES

Announcing the consolidation of our plant and sales office at 2106 South Kilbourn Avenue (4500 west), Chicago 23, Illinois, on September 1, 1956 (phone until August 26, Central 6-0500, and after August 26, Crawford 7-2000.)

PARTIAL LISTING

BORING MACHINES

Foote-Burt Vert. 26" sw, new 1941
#49 Heald Borematic, new 1944

DRILLS

1 spdl, 14" sw, #2 Avey, new 1945
1 spdl, 20" sw #2LMS L.-G., 1945
1 spdl, 24" sw, #2MA6 Avey, new 1942
1 spdl, 26" sw, #4MS L.-G. hydraulic
2 spdl, 24" sw, #3 Avey, AC MD
3 spdl, 20" sw, #2LMS L.-G. 1942
3 spdl, 24" sw, #3MS L.-G. new 1943
4 spdl, 14" sw, #2LMS L.-G. new 1942
6 spdl, 20" sw, #1LMS L.-G. new 1943
#314-A Baker Univ. H.D., 1943
16 spdl, Fox #K60H, #2 taper, 1944

BORING MACHINES

Foote Burt Vert. 26" sw, new 1941
#49 Heald Borematic, new 1944

GRINDERS

3"x12" #5 B&S, Rap. Trav., 1948
3"x18" #5 B&S, Rap. Trav. 1942
4"x12" #4H Landis, 1942
4"x18" No. 4H Landis 1943
6"x18" Norton Type C, new 1943
10"x18" Norton Type C, new 1943
10"x36" Norton Type C, new 1943
10"x48" Norton Type C, new 1943
10"x50" Hill-Clarke, AC Mot. Dr.
10"x72" Hill-Clarke, AC Mot. Dr.
10"x96" Hill-Clarke, AC Mot. Dr.
10"-20"x36" Norton, angular wheel
10"x72" Hill-Clarke, AC Mot. Dr.
16"x26"x72" Norton, AC MD, 1941
42"x72" Norton, extras, new 1947
18"x96" Hill-Clarke, AC Mot. Dr.
18"x120" Norton, AC MD
24"x264" Norton, AC MD, Rebuilt
26"-32" Gap x 114" Norton Pl. Cyl.
#5A Bryant Internal, new 1943
#16A-16 Bryant Internal, new 1943
#16-36 Bryant Internal, new 1941
#24-26 Bryant Internal, new 1941
#24-36 Bryant Internal, new 1941
#72A3 Heald Int. Bizematic, 1944
#72A5 Heald Internal, new 1942
#72A5 Heald Bridge Type Int.
#214 Besly Double End Disc, 1946
#3 B Abrasive Surf, 8"x24" Table 1945
#18-30" Blanchard Rot. Surf.

LATHES

16ML, 16"x36" LeBlond Auto.
#16ML-16 LeBlond, Semi-Auto, 36" cc
12"x30" Hendey Lathe, Taper Att.
12"x28" Lipe Carbo Semi-Auto
14"x36" Amer. Grd. Hd., MD
27"x84" Amer. Grd. Hd., MD
24"x42" Pay Auto. AC MD
36"x120" Putnam Grd. Hd., MD
R14 Seneca Falls, 16"x36", 1942
120"x96" cc N-B-P, ser. 3380
#5W Cinn Acme Univ. Turret
#4 Gisholt Univ. Tur. A.C.&B.F.
#3H-10 Libby H.D. Tur. 1942
#4A W&S Turret, new 1941
4FU Fastermatic, tur. 33" sw, 1944
#8D Potter & Johnston, new 1941

MILLERS

54"x30"x16 Ingersoll Slab, 1934
54"x8" Ingersoll Openside, 1942
54" Ingersoll Vertical Rot.
#M-24 K&T Prod. 1941
#6V Davis & Thompson Vert., 1944
3½" Bar Cinn. Gilbert Table Type HBM
#12-B Pratt & Whitney Profilers
16"x60" P&W Mod. B Thread Mill
#LT 6"x72" L.B Thread
#CT L.B Thread Mill new 1942
No. 2 Cinn. Univ. Hi-Power
#36 Van Norman, Rebuilt, 1941
#1-14 Van Norman Prod. 1942

PLANERS

30"x36"x12' Rockford Openside '42
60"x48"x22' American, 4 hds.
60"x48"x30' Hamilton, 4 heads

MISCELLANEOUS

6" Goss & DeLeeuw 8 spdls. 1941
#306 Barnes Vert. Hone, new 1942
15 Ton Hyd American Press, 1946
#11HD 2 Hd. W&S Tapper, latest
#36BM G&E 3 Spdl. Bevel Gear
#61A Fellows Gr Shaper 18" ram
#5A Kaufman Pneu Tapper 1945
#HR8 Barber-Colman Sharp Mach
15 T Toledo Overhead Crane, 39'6

HILL-CLARKE MACHINERY COMPANY 2106 S. KILBOURN AVE., CHICAGO 23, ILL.

PHONE: CRawford 7-2000

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

(Not Available for Equipment Advertising.) $1.50 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

POSITION WANTED undisplayed rate is one-half of above, payable in advance.

BOX NUMBERS count 1 line additional.

INFORMATION

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A.M.

DISPLAYED RATE

The advertising rate is $14.50 per inch for all Business Opportunities & Equipment advertising appearing on other than a contract basis. Contract rates quoted on request.

EMPLOYMENT OPPORTUNITIES. $10.30 per inch, subject to agency commission.

SEND NEW ADS or Inquiries to Classified Adv. Div. of American Machinist, P.O. Box 12, 330 W. 42 St., N.Y. 36, for September 10th issue closing August 24th

---

DESIGNER

Experienced in machine tools, automatic loading and unloading devices. Ideal working conditions in new plant of a long established company. Relocation expenses paid. High salary to qualified men. Resume of experience and background.

WADELL EQUIPMENT CO.

Manufacturers of Precision Boring Machinery

CLARK, NEW JERSEY

"Key to Preventive Maintenance"

MACHINE TOOL RECONDITIONING

& the Art of Hand Scraping (new 2nd printing) —useful for design, shop & inspection work— Write for folder describing illustrated book

MACHINE TOOL PUBLICATIONS

215 Commerce Bldg., Fourth & Wabash Sts. St. Paul 1, Minn.

PROFESSIONAL SERVICES

COST REDUCTION PROGRAMS

- Organization
- Methods Improvement
- Job Evaluation
- Wage Incentives
- Budgetary Controls
- Diversification

WALLEY & ASSOCIATES

Management Consultants

Surveys — Installations — Training

25 Seminary Avenue Dayton 3, Ohio

CONTRACT WORK

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small

MATCH PLATE WORK A SPECIALTY

Put your pattern problems up to us — we will take care of them.

CINCINNATI GENERAL PATTERN WORKS

2733 Buck Street Cincinnati, Ohio

REPLIES (Box No.) Address to office nearest you c/o this publication Classified Adv. Div.
NEW YORK: P.O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Machine Shop Assistant needed by medium sized heavy process machinery manufacturer. Young college engineer graduate with some experience preferred. Position has a future. First duties will cover rate setting, carbide tool development and assist in increasing productivity. Company has liberal profit sharing plan. Salary open. Location S.E. Penna. Reply P-9590, American Machinist.

Mechanical Engineer—To head newly created department responsible for practical research and development of heavy construction equipment, purchasing, administration and maintenance. Excellent opportunity with progressive general contractor, Central Ohio. P-2677, American Machinist.

POSITION WANTED

Manufacturing Executive seeks new connection. Background of production engineer, factory manager and general manager in business machines, industrial instruments and machine tools. PW-2256, American Machinist.

BUSINESS OPPORTUNITY

Patent #2,546,656 new kitchen utensil (T.M.R.) "Piemaster" modern way making pies. T.V. natural. Open aluminum stamping manufacturing distributor. Outright sale or royalty. BO-2617, American Machinist.

FOR SALE . . . LIKE NEW

1 Jones & Shipman #540, 6 x 18 Hydraulic Surface grinder.

1 #40 index—vertical mill—with measuring rods, indicators, verniers

1 Bridgeport-Ram type over-arm-model J Milling head.

1 Wilson, 24 x 24 x 10' planer motorized.

1 Bryant #5, internal grinder, AA1 condition—Serial #K8195.

A & B MACHINERY CO.

G.P.O. Box 464, Syracuse 1, N. Y.

Telephone ☎ 73-4411

Chicago No. 410-D Brake, NEW.

Fellows No. 4B Gear Burnisher.

Gleason 3" Str. Bevel Gear Generators.

K & T No. 3B Plain Mill, vert. attach., MIB.

4357 St. Paul Blvd., Rochester 17, N. Y.

D. E. DONY MACHINERY CO.

MOTORS • GENERATORS
TRANSFORMERS
NEW • REBUILT
WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT CO.

PHONE STATION COLLECT GL 6783

P.O. BOX 51 ROCHESTER 1, NEW YORK

ELECTRIC FURNACES TO 1850F

with Auto Temp Control. Sliding door, heavily insulated, substantial, accurate, dependable for machine shop, tool room, laboratory New

8"x12"x15" inside 4.5 K.W. $300.00

12"x16"x20" inside 9.0 K.W. $500.00

E. H. WILLIAMS

BOX 9042A, HUNTINGTON, W. VA.

FOR SALE

SIP Hydroptic 6 Jig Boring Machine
New 1952
Machine has 33 x 42" Table
Complete set of Tool and Locating Fixtures
17" dia. Rotary Table
Condition equivalent to new—Very little Use
Available for Immediate Delivery

AMERICAN INSTRUMENT COMPANY

8030-8050 Georgia Ave., Silver Spring, Md.

NEW TOLEDO DIAL SCALE

12,500 lb. capacity—4'x5' platform

Write for details

A. D. HARRIS

500 40th St., Rock Island, Ill.

FOR SALE

#4 Cincinnati Centerless Grinder #3M4H1K (Fil-matic)
#35L Excello Thread Grinder #1303
#39A Excello Internal and External Thread Grinder #9185
Sundstrand Plain Duplex Milling Machine, Model #33FM18120, Ser. #96-265 (10 ft. table). Write

ALBERT TOOL & GAGE CO.

2301 Harrison Kansas City 8, Mo.

NEED ENGINEERS?

An employment advertisement in the SEARCHLIGHT SECTION will help you find the engineers you need. It's an inexpensive, time-saving method of contacting competent personnel for every engineering job in the Metalworking industry. The all paid circulation of AMERICAN MACHINIST offers you an opportunity to choose the best qualified men available. For rates and information write:

Classified Advertising Division

AMERICAN MACHINIST

P.O. Box 12

New York 36, N. Y.

Index of PRODUCTS ADVERTISED In This Issue

Abrasives (Not Bonded) 40
Accessories & Attachments (Machine Tool) 22-23, 40A, 74, 199

Bearings 4th Cover, 82, 144B, 188
Books, Technical 200
Boring, Drilling & Milling Machines (Horizontal) 14-15, 81
Boring Machines Internal 2nd Cover, 32, Insert Bet. 32-33, 33
Boring & Turning Machines (Vertical) 14-15, 32, Insert Bet. 32-33, 33, 61, 72
Broaching Machines 26-27, 121, 122
Brushes 189

Castings 210
Centering Machines 226
Centers, Live 200
Chucks 51, 68, 166
Cleaning & Drying Machines & Supplies 192
Collets 51
Compressors, Air 168-169, 204
Controls, Electrical Insert Bet. 40A-40D, 162
Coolant Systems, Filters & Supplies 176
Cut-Off Machines 34-35, 206
Cutters, Abrasive 180

Dressers 210
Drilling Machines 53, 59, 64-65, 67, 85, 151
Duplicators & Pantographs 32, 81

Electrical Parts & Equipment Insert Bet. 40A-40D
Electro Plating & Painting Equipment & Supplies 168-169
Engineering & Production Services 206

Fabricating Methods & Services 157, 206
Fasteners 3rd Cover, 42, 124, 206

Gages & Instruments 56, 58, 145, 159, 161, 177, 209, 221
Gear Cutting Machines 3, 6-7, 36, 162, 222
Gears, Speed Reducer, Motor Reducers 208, 226
Gear Testers 3, 6-7, 222
Grinders—Cutter & Tool 78, 208, 228
Grinding Machines—Production 12-13, 16-17, 40D, Insert Bet. 56-57, 145, 178-179, 228
Grinding Wheels 18, 74, Insert Facing 144

Heads: Drilling, Grinding & Tapping 50, 199, 208, 210
Heat Treating Equipment & Supplies 44-45, 170, 202
Honing Machines 164-165
Hydraulic & Pneumatic Parts & Equipment 149

(Continued on page 222)

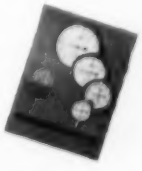
AMES

Check Motions or Dimensions In .001" up to 10" Range.

Ames Long Range Dial Indicators in a variety of models are made for quality control applications requiring close tolerance and inspection. For example, you can measure in .001", long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel of up to 10".

In addition, Ames Long Range models have all the advantages that are built into Ames regular indicators:—dials of large diameter; easy-to-read, widely spaced graduations; movable dials; replaceable contacts. All Ames Long Range indicators have count hands to indicate revolutions of the indicator hand. Those with box covered, rack guide have a slot in the cover graduated to register each inch of spindle movement.

Write today, sending your problem in long range measuring. Ames will be glad to suggest a solution. Be sure to include drawings and specifications—your answer will be back faster if you do.



Representatives in principal cities

B.C. AMES CO.

26 Ames Street, Waltham 54, Mass.

MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

5410

NOW CUT COST OF PRECISION GEAR PRODUCTION

THIS FEATURE: "Independent selection of speed, feed and indexing," sets the Hamilton Precision Small Gear Hobber apart from the field,

AND ENABLES the users of this machine to vary speed and feed to suit the material being machined,

THIS FACT, and a "reserve of accuracy" built into the machine, work spindle and hob spindle runout of less than .0002" as an example,

CONTRIBUTES to more gear precision with no sacrifice of gear production,

OR INCREASED gear production with no sacrifice of gear precision, OR BOTH!

Prices and specifications without obligation

ASK FOR **FREE** BULLETIN 5410

Address
The Hamilton Tool Company
830 South Ninth Street
Hamilton, Ohio

IT'S A Hamilton Tool

USE IT WITH CONFIDENCE

REPRESENTED IN CANADA BY
Sykes Tool Corporation, Ltd., 123/131 York Street, Toronto
Sykes Tool Corporation, Ltd., 515 Bisson Street, Montreal

Tough Metalworking Problems? Try this . . .

For the answers to questions of classification and selection of types of steel and non-ferrous metals, machining, heat-treating, forming, cleaning, joining, finishing . . . everything from raw stock to finished product . . . all in a single 288 page, 8¼" x 11" booklet—*"How to Work Metals"* . . . a *must* for every metalworking plant and shop. Convenient, easy-to-use, combining two Special Reports "How to Work Steel" and "How to Work Non-Ferrous Metals." Concise, complete, liberally illustrated. $1.00

American Machinist, Reader Service Department
330 West 42nd Street, New York 36, New York

Index of PRODUCTS ADVERTISED

In This Issue

(*Continued from page 221*)

Jig Borers 196, 201
Jigs & Fixtures 206

Keyseaters 200, 214

Lathes, Automatic 19, 80
Lathes, Engine 32, 46, 186-187, 197
Lathes, Turret 22-23, 80, 167, 214
Lubricants, Cutting Fluids, Quenching Oils & Solvents 30-31, 52, 126, 155, 163, 185

Marking Machines, Tools & Supplies 210
Materials, Cutting & Forming 69, 173, 190-191
Materials of Manufacture ..... 63, 70-71, 76, 147, 188, 196, 205, Insert Bet. 208-209, 213, 214, 227
Materials Handling Equipment 48
Millers, Die Sinkers, Profilers 4-5, 8-9, 20-21, 37, 128, 181, 200, 226
Motors, Electrical 207

Oil Purifiers 176

Power Transmission 202
Presses, Forging & Forming Equipment & Supplies 34-35, 86, 153, 160, 193, 203, 208, 211, 212, 223, 225
Pumps, Circulating 166

Riveting Machines 227
Safety & Welfare Equipment 155, 212B
Saw Blades 54, 78
Sawing Machines 54, 78, 206, 225
Screwdriving, Nutrunning Machines & Tools 62
Screw Machines; Chucking Machines Insert Bet. 32-33, 41, 49, 172
Shapers, Slotters, Keyseaters 88, 227
Special Machine Tools 28-29, 38-39, 43, 55, 81, 202
Spindles, Machine 74, 210, 224
Steel Blue 206

Tapping Machines 64-65
Thread Cutting Machines 10-11
Thread Rolling Machines & Tools 10-11, 50
Tools, Cutting ..... 24-25, 66, 69, 122, 171, 184, 190-191, 210, Insert Facing 212
Tools, Measuring 200
Tools, Portable 57, 60, 62
Transportation 174-175
Turret Attachments, Lathe 22-23

Used & Surplus Equipment 216-220

Vises 196

Welding & Cutting, Brazing & Soldering Equipment & Supplies ..... 47, Insert Bet. 176-177, 182-183, 198, 203

INDEX TO ADVERTISERS

This index is published as a convenience to the readers. Every care is taken to make it accurate, but AMERICAN MACHINIST assumes no responsibility for errors or omissions

	Page
Acromark Company	210
Allis Company, Louis	207
Allison Company	180
American Chain Cable Co., The	48
American Machinist	194-195
American Optical Company	212B
American Steel Foundries, King Machine Tool Division	72
American Tool Works Co.	59
Ames Company, B. C.	221
Armstrong Blum Mfg. Company	54
Armstrong Brothers Tool Company	40A
Atlantic Refining Company	185
Austin Industrial Corp.	37
Baldwin-Lima-Hamilton Corp.	186-187
Bardons and Oliver Inc.	167
Barnes Co., W. F. & John	55
Barnes Drill Company	176
Baush Machine Tool Co.	43
Benchmaster Manufacturing Co.	212
Bethlehem Steel Company	173
Bilgram Gear & Machine Company	226
Blanchard Machine Co.	40D
Brown & Sharpe Mfg. Co.	128
Brush Electronics Company	209
Buffalo Forge Co.	211
Bullard Co.	61
Bunting Brass & Bronze Co.	188
Burg Tool Mfg. Company	85
Carborundum Company Insert Facing	144, 196, 214, 227
Chandler Tool Company	208
Chase Brass & Copper Co., Inc.	213
Chicago Pneumatic Tool Company	62
Cincinnati-Bickford Tool Co. Sub. Giddings & Lewis Machine Tool Co.	53
Cincinnati Grinders Incorporated	16-17
Cincinnati Milling Machine Co.	4-5
Cincinnati Shaper Co.	88
Cleveland Crane & Engineering Co.	86
Cleveland Punch & Shear Works Company	193
Cleveland Twist Drill Co. Insert Facing	212
Columbia Geneva Div.	76
Columbus Die-Tool & Machine Co	206
Cone Automatic Machine Co.	41
Copperweld Steel Co. Ohio Seamless Tube Div.	157
Cross Company	28-29

(Continued on page 224)

NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.

A.H. NILSON MACHINE COMPANY

1519 RAILROAD AVENUE, BRIDGEPORT 5, CONNECTICUT

X Multiply the use of your surface grinder...

+ Add a *Whitnon*

HIGH SPEED ATTACHMENT

Most 6x18 surface grinders can now be used to finish small radii on dies or parts requiring small contour grinding by merely adding a Whitnon high speed surface grinder attachment. This assembly, in effect, creates an extra machine at little cost and increases the production range of your present grinder.

Whitnon surface grinder attachment comes as a complete kit, and can be shipped in a fitted wooden case. The offset pulley No. 5 makes it possible to reach into deeper holes and recesses than the flat pulley. Tapered arbors up to 4" in length available for direct wheel mounting if required.

1. Bracket 2. Eccentric bushing 3. 20,000 RPM grease lubricated spindle 4. Flat pulley 5. Offset pulley 6. Belt 7. Wheel & pulley mount 8. Collet type arbor 9. Arbor wrenches 10. Wheel & wheel mount wrench

THE *Whitnon* MANUFACTURING COMPANY

ROUTE 6 AND NEW BRITAIN AVE., FARMINGTON, CONNECTICUT

From the *American Machinist* Library of *Tips for Top Shop Men*

"QUEER DUCKS"—the men that don't fit the pattern—are also the men who don't think like the rest. They'll give you trouble, but they'll usually also give you ideas. Barnyard ducks conform readily to rules, but end up in a pot.

INDEX TO ADVERTISERS

(*Continued from page 223*)

	Page
Crucible Steel Co. of America	63
Curtis Pneumatic Machinery Div. Curtis Mfg. Co.	204
Davis Keyseater Company	200
Davis & Thompson Co.	226
DeVilbiss Company	168-169
Diamonite Products Div. U.S. Ceramic Tile Company	184
Dodge Manufacturing Corporation	202
duMont Corporation	66
Dykem Company	206
Eastern Machine Screw Corporation	210
Eastman Kodak Co. Industrial X-Ray	159
Economy Engineering Co.	202
Ex-Cell-O Corporation	74
Fellows Gear Shaper Company	6-7
Foote-Burt Company	121
Gallmeyer & Livingston Co.	228
General Electric Apparatus Dept. Insert Bet. 40A-40D,	44-45
Giddings & Lewis Machine Tool Company	14-15
Gisholt Machine Company	19
Gleason Works	3
Goss & DeLeeuw Machine Company	172
Grant Mfg. & Machine Company	227
Greaves Machine Tool Company	200
Grip Nut Company	206
Gulf Oil Corporation	52
Hamilton Tool Company	222
Hannifin Corp.	225
Hanson-Whitney Company, Division of Whitney Chain Company	177
Hardinge Brothers, Inc.	51
Harnischfeger Corp.	198
Heald Machine Co. Sub. Cincinnati Milling Machine Co.	2nd Cover
Holo-Krome Screw Corporation	3rd Cover
Hones, Inc., Charles A.	202
Ideal Industries, Inc.	200
Investment Casting Company	210
Kearney & Trecker Corp.	20-21
Kent-Owens Machine Company	181
King Machine Tool Div. American Steel Foundries	72
Kingsbury Machine Tool Corp.	64-65
Landis Machine Company	10-11
Landis Tool Company	12-13
LaPointe Machine Tool Company	26-27
LaSalle Steel Company	205
Lees-Bradner Company	36

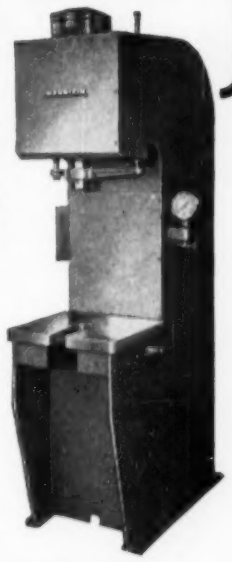
INDEX TO ADVERTISERS

	Page
Leland-Gifford Company	67
Linley Brothers Co.	196
Lodge & Shipley Company	46
Mackintosh-Hemphill Div. E. W. Bliss Co.	153
Mallory & Company, Inc., P. R.	47
M. B. I. Export & Import Ltd.	196, 201
McKay Machine Co.	203
Metal Treating Institute	170
Micromatic Hone Corp.	164-165
Minganti & Co., G.	214
Monsanto Chemical Co.	155
Morris Machine Tool Co.	151
Morse Twist Drill & Machine Co.	24-25
Motch & Merryweather Machinery Company	78
National Acme Company	49, 50
National Broach & Machine Co.	122
National Machine Tool Co.	214
Nebel Machine Tool Corp.	197, 227
New Britain Machine Company, The	32, Insert Bet. 32-33, 33
New Departure Div.; General Motors Corporation	82
Niagara Machine & Tool Works	34-35
Nilson Machine Co., A. H.	223
Norton Company	18, 40, Insert Bet. 56-57
Oakite Products Inc.	192
Ohio Seamless Tube Div. Copperweld Steel Co.	157
Osborn Mfg. Co.	189
Pipe Machinery Company	161
Pope Machinery Corp.	210
Potter & Johnston Co.— Sub. Pratt & Whitney Co., Inc.	80
Pratt & Whitney Co., Inc.	81, 162, 171
Railway Express Agency	174-175
Reich, Mfg. Co., J. R.	210
Republic Steel Corp.	70-71
Revere Copper & Brass Inc.	147
Reynolds Metal Company	Insert Bet. 208-209
Ross Operating Valve Company	149
Rotor Tool Co.	57
Ruthman Machinery Company	166
Scherr Co., Inc., George	200
Schmarje Tool Co.	210
Sciaky Bros. Inc.	Insert Bet. 176-177
Sheffield Corp.	145
Shell Oil Co.	30-31

(Continued on page 226)

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,306
8-TON	$1,356
10-TON	$1,855
25-TON	$3,401

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

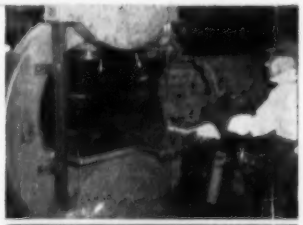
WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 517 S. WOLF ROAD, DES PLAINES, ILLINOIS

FRICTION SAWING

with Tannewitz HIGH SPEED BAND SAWS

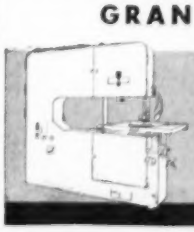


FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

THE TANNEWITZ WORKS ☎ GL-6-1729

GRAND RAPIDS, MICHIGAN

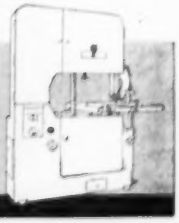


TANNEWITZ DIE-SAWS

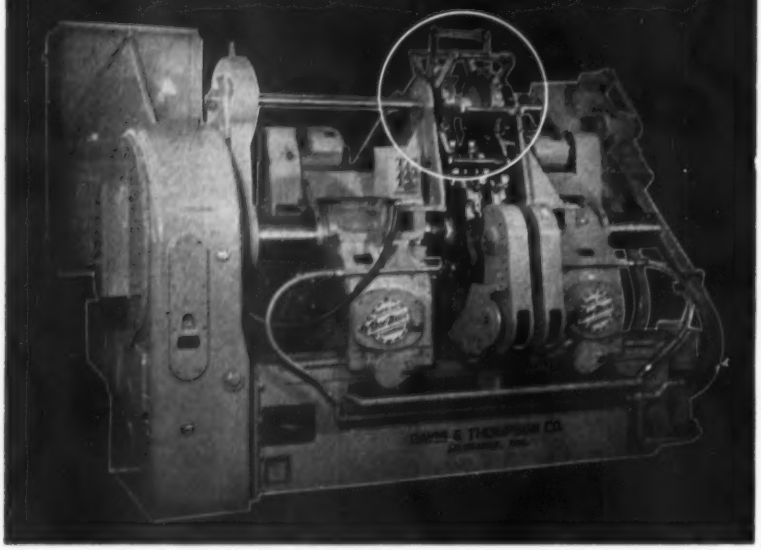
24", 36", 48", 60" CAPACITIES

for CONTOUR SAWING, FILING, POLISHING

The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



...Milling and Centering Steering Gear Shafts at the Rate of 360 Per Hour



This continuous type milling and centering machine has been furnished with an automatic unloader (indicated by circle) which transfers finished parts onto a conveyor or discharge chute. Milling and centering of both ends is done simultaneously and in continuous production.

Basically, this is a standard ROTO-MATIC machine tooled-up to handle special production requirements. Rough and finish milling and centering spindles in both heads have micrometer endwise adjustment. Heads are adjustable on the ways. With equalizing jaws in fixtures plus chain clamping, machine is fully automatic.

If you have work of this nature, consult D&T engineering for further details.

Roto-Matic

Davis and Thompson Co.

4440 N. 124th ST. MILWAUKEE 10, WISCONSIN

BILGRAM TRADE MARK

ANGLE BEVEL GEARS WITH GENERATED TEETH

ALL TYPE GEARS

BILGRAM

GEAR & MACHINE WORKS

1217-35 Spring Garden

Philadelphia, Pa.

INDEX TO ADVERTISERS

(Continued on page 225)

	Page
Sinclair Refining Co.	163
S. K. F. Industries Inc.	144B
Skinner Chuck Company	166
Smith Corporation, A. O.	182-183
Snyder Tool & Engineering Co.	38-39
Stahl Gear & Machine Company	208
Standard Pressed Steel Co.	42
Stupakoff Division of Carborundum Company	69
Sun Oil Company	126
Taft-Peirce Mfg. Company	58
Tannewitz Works, Inc.	225
Tennessee Coal & Iron Div. Thompson Grinder Company	76, 178-179
Thor Power Tool Co.	60
Timken Roller Bearing Co. Industrial Division	4th Cover
Triplex Machine Tool Corp.	206
United States Drill Head Co.	199
United States Steel Corp.	76
United States Steel Export Div.	76
United States Steel Supply Div.	76
Vaill Engineering Company	208
Van Keuren Co.	56
Van Norman Machine Co.	8-9
Vascaloy Ramet Corporation	190-191
Vlier Engineering, Inc.	124
Walker Co., Inc., O. S.	68
Waltham Machine Works	208
Warner & Swasey Company	22-23
Whitnon Mfg. Co.	224
Wittek Manufacturing Co.	160

AMERICAN MACHINIST ADVERTISING SALES STAFF

Atlanta 3 . . . M. H. Miller, 801 Rhodes-Haverty Bldg., Walnut 5778
Boston 16 . . . J. H. Koch, 350 Park Square Bldg., Hubbard 2-7160
Chicago 11 . . . W. J. Haring, P. F. Pritchard, 520 N. Michigan Ave., Mohawk 4-5800
Cincinnati 8 . . . R. H. Anderson, 1110 Delta Ave., East 1-6110
Cleveland 15 . . . Gifford W. Plume, Jr., R. H. Anderson, 1510 Hanna Bldg., Superior 1-7000
Dallas 2 . . . G. L. Jones, Jr., Adolphus Tower Bldg., Prospect 5064
Detroit 26 . . . W. J. Reichard, 856 Penobscot Bldg., Woodward 2-1793
Los Angeles 17 . . . H. L. Keeler, 1125 West Sixth St., Madison 6-9351
New York 36 . . . G. H. Krimsier, J. F. Juraschek, B. C. Nicholas, 330 W. 42nd St., Longacre 4-3000
Philadelphia 3 . . . J. P. Tiebout, Architects' Bldg., 17th & Sansom Sts., Rittenhouse 6-0670
Pittsburgh 22 . . . K. Reeves Cook, 919 Oliver Bldg., Atlantic 1-4707
St. Louis 8 . . . P. F. Pritchard, 3615 Olive St., Continental Bldg., Jefferson 5-4867
San Francisco 4 . . . R. C. Alcorn, 68 Post St., Douglas 2-4600
England . . . Herbert Lagler, McGraw-Hill House, 95 Farringdon St., London, E. C. 4

INDEX TO ADVERTISERS

PROFESSIONAL SERVICES 220

■

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mfg.

EMPLOYMENT OPPORTUNITIES 220

SPECIAL SERVICES 220
Contract Work 220
Cincinnati General Pattern Works.... 220

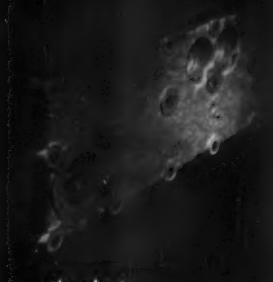
BUSINESS OPPORTUNITIES
Offered 220

EQUIPMENT
(Used or Surplus New)
For Sale 215-220

ADVERTISERS INDEX

Albert Tool & Gage Co. 220
American Instrument Co., Inc. 220
Bennett Machinery Co. 216
Dony Machinery Co. 220
Eastern Machinery Co., The 217
Electric Equipment Co. 220
Falk Machinery Co. 219
Harris, A. D. 219, 220
Hill-Clarke Machinery Co. 219
Hyman & Sons, Joseph 216
Indianapolis Machinery & Supply Co. 216
Laurens Bros., Inc. 218
Machine Tool Publications 220
Miles Machinery Co. 219
Morey Machinery Co., Inc. 216
United Machinery & Tool Corp. 215
Wadell Equipment Co. 220
Walley & Associates 220
Williams, E. H. 220

BORES MOTOR BLOCKS 22% FASTER—
AND WITH 28% LESS TOOL WEAR



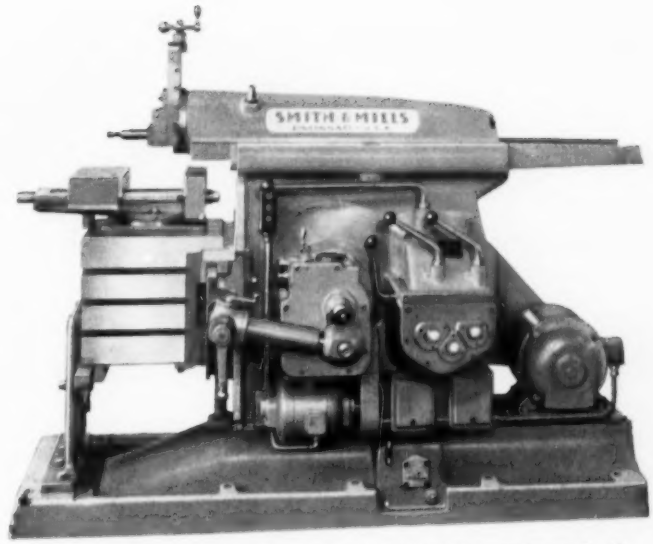
...thanks to

FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 14, Niagara Falls, N.Y. 56-64

CARBORUNDUM®



Bull ram gear, rocker arm and universal table trunnion made of ductile iron for extra rigidity.

SMITH & MILLS SHAPERS—
for production and tool room

Compare Smith & Mills with any other shaper for versatility, speed, cutting power and precision performance. *Compare* and you'll *buy* Smith & Mills—famous for high quality shapers since 1888. Write or wire for prices, deliveries, repair parts or field service. Smith & Mills Shaper Division, Nebel Machine Tool Corp., 3407 Central Parkway, Cincinnati 25, Ohio.

Smith & Mills Shapers now available in Heavy Duty Models in 16", 20", 25", 28", 32" and 36" strokes, and Standard Duty Models in 20" and 24" strokes.

Smith AND Mills SHAPERS CINCINNATI

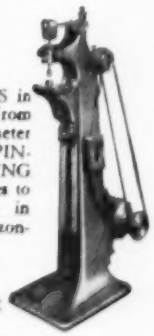
GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ¼" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method — Sizes to meet all needs — Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

85 Silliman Ave., Bridgeport, Conn., U. S. A.



FOUND WHERE AIRCRAFT POWER AND CONTROLS TAKE SHAPE

GRAND RAPIDS GRINDERS

Bendix
BENDIX PRODUCTS DIVISION
BENDIX AVIATION CORP.

FAIRCHILD ENGINE DIVISION
FAIRCHILD ENGINE AND AIRPLANE CORP.

FORD INSTRUMENT COMPANY
DIVISION OF SPERRY RAND CORP.

HAMILTON STANDARD DIVISION
UNITED AIRCRAFT CORP.

LEAR, INCORPORATED

ORENDA ENGINES LIMITED

PRATT & WHITNEY AIRCRAFT
DIVISION OF UNITED AIRCRAFT CORP.

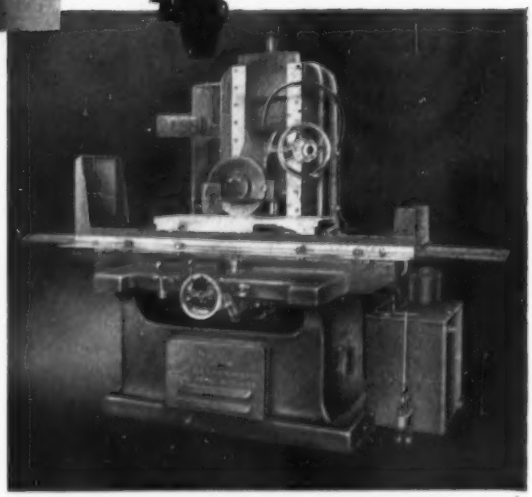
WRIGHT AERONAUTICAL DIVISION
CURTISS-WRIGHT CORP.

SUPER SABRE F-100
NORTH AMERICAN AVIATION, INC.

Precision is paramount in the manufacture of components for aircraft power and control. That's why these makers of precision parts have Grand Rapids Grinders in their toolrooms — for the utmost in precision grinding.

Model No. 55, for example, features one-piece column and base for permanent vibrationless rigidity. Longitudinal travel table and cross feed are hydraulically actuated. Wheel head has powered rapid vertical travel. And it's faster than any other grinder of this type and size . . . with variable table speed up to 125 fpm.

With these built-in precision features typical of all Grand Rapids Grinders, it's no wonder they're found in leading toolrooms.



GRAND RAPIDS NO. 55 HYDRAULIC FEED SURFACE GRINDER. Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speeds 1925 and 2500 rpm.

A note on your letterhead will bring full details.

GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON COMPANY

430 Straight Ave., S.W., Grand Rapids, Michigan

INSIDE INFO FROM HOLO-KROME

H-K's sharp socket corners resist reaming!

THE SECRET'S IN THE SOCKET!

Sharp hex socket corners mean less reaming —the payoff's on the production line with fewer damaged screws, less downtime and improved product appearance!

Compare These Other H-K Features!

COMPLETELY FORGED SOCKET HEAD . . . no drilling or broaching—metal fibers stay intact for stronger hex sockets.

SCIENTIFICALLY DESIGNED SOCKETS . . . depth carefully proportioned to give greatest head and socket strength, firmest key grip.

UNTAPERED WALLS . . . for better key fit, longer key and socket life, even tighter wrenching.

For the finest in Socket Screw products . . . for revolutionary SAME-DAY SERVICE, the name to remember is Holo-Krome!

LOOK INSIDE A HOLO-KROME SOCKET!

Send in the coupon below and we'll send you FREE an H-K Socket Cap Screw (we've omitted heat treating to let you get a better look at the mirror finish and sharp hex corners under the usual black finish). Look it over carefully, and see for yourself what a real difference H-K quality and skill can make!

Please send me FREE a Holo-Krome Socket Screw for my inspection.

NAME _____

POSITION _____

COMPANY _____

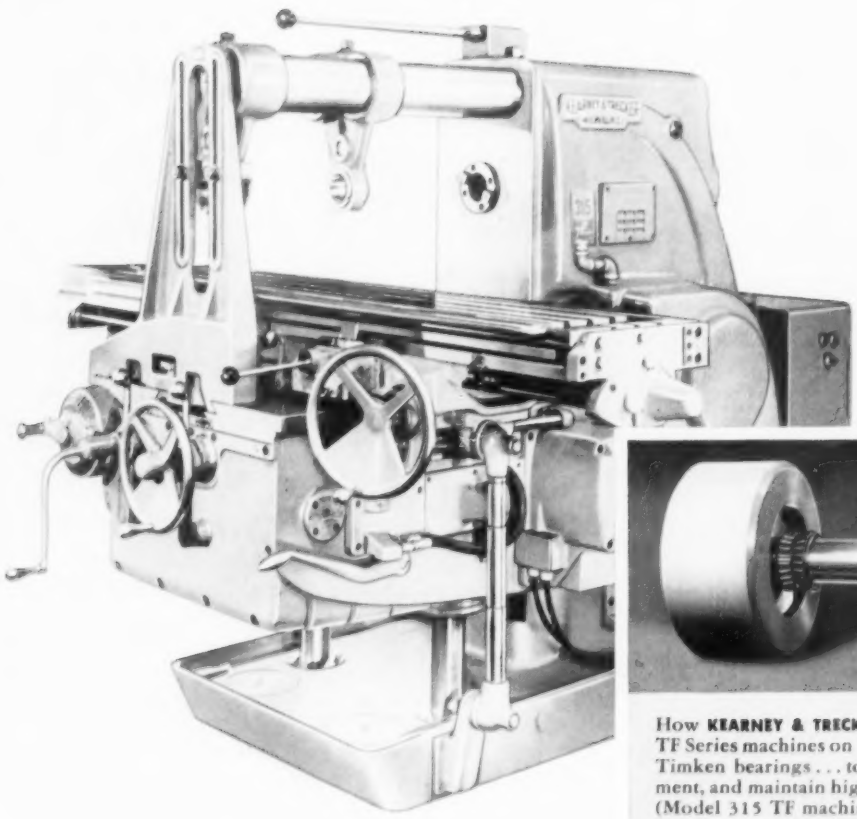
ADDRESS _____

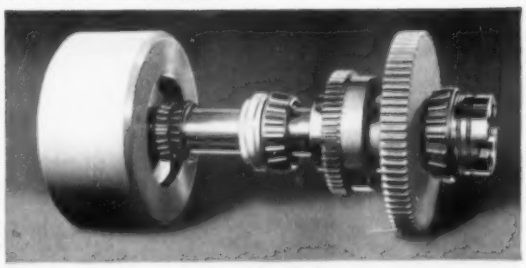
CITY _____ ZONE _____ STATE _____

HOLO-KROME

THE HOLO-KROME SCREW CORP., HARTFORD 10, CONN.

Sold only through authorized Holo-Krome distributors.





How **KEARNEY & TRECKER** mounts the spindle of its TF Series machines on 2 single-row and 1 double-row Timken bearings . . . to hold spindle in rigid alignment, and maintain high accuracy through 24 speeds. (Model 315 TF machine illustrated).

New milling machine gets constant accuracy through 24 speeds with spindle on TIMKEN® bearings

FROM 15 to 1500 rpm, with 24 speed changes in all, and plenty of capacity for any tool load—that's the new TF Series of twin-screw designed Kearney & Trecker mills. There are 28 Timken® bearings contributing to these machines' built-in stamina and constant high precision. Most importantly, the spindle is mounted on two single-row and one double-row Timken precision bearings which hold it in rigid alignment through all speed and load changes. Chatter is eliminated, and long bearing life with minimum maintenance is assured.

Because of their tapered design, Timken bearings take radial and thrust loads in any combination. Full line contact between rollers and races imparts extra load-carrying capacity. And of course, with Timken bearings designed to last as long as the machine itself, maintenance costs go down.

Geometrically designed to give true rolling motion, Timken bearings are precision manufactured to live up to their design—produced under rigid inspection and quality control. We even make our own fine alloy steel, something done by no other American bearing manufacturer. When you build or buy equipment, look for the "TIMKEN" trade-mark on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD